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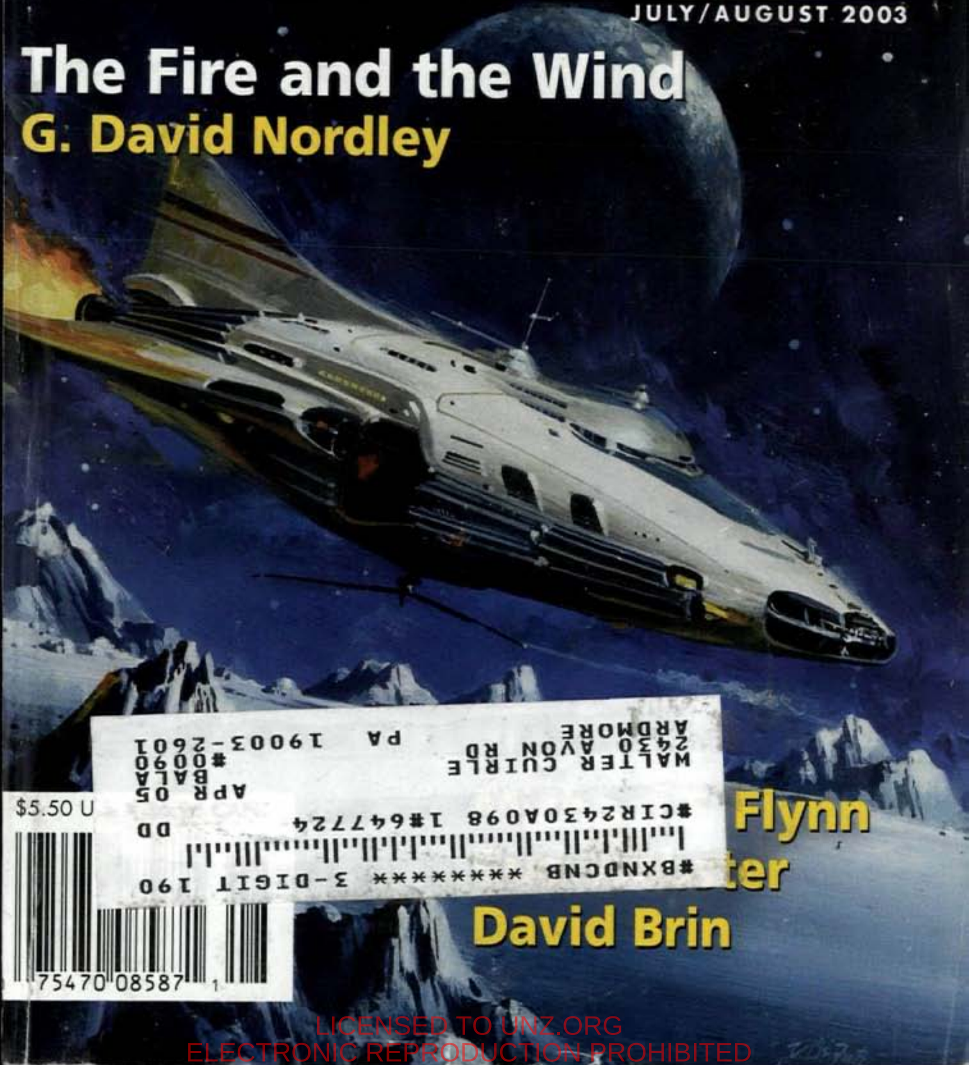
ANALOG

SCIENCE FICTION AND FACT

JULY/AUGUST 2003



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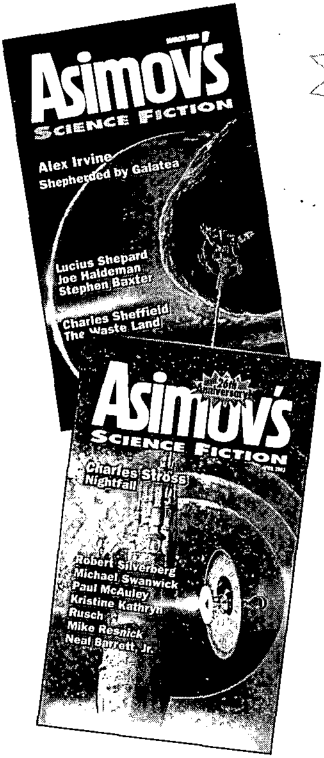
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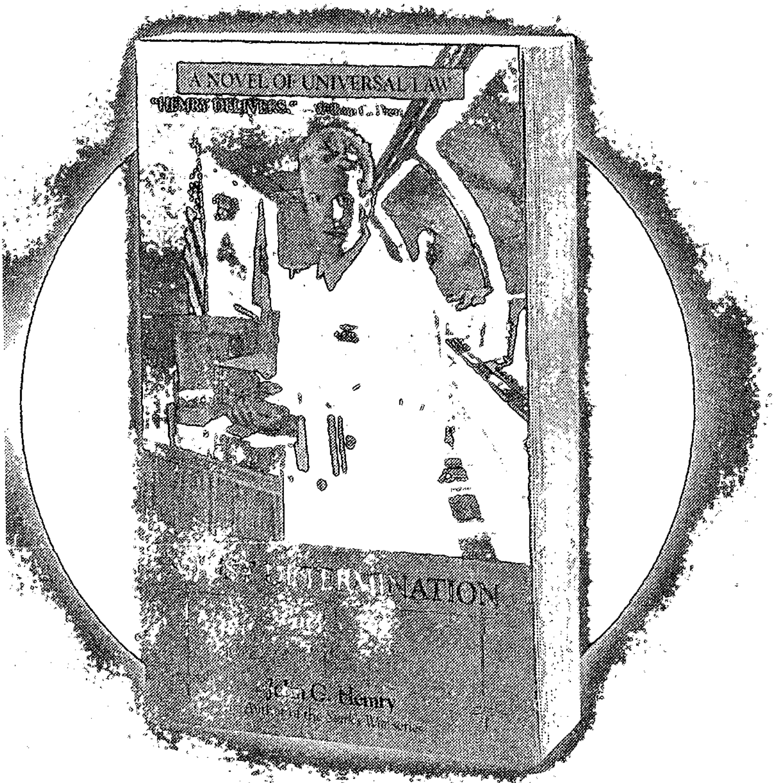

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Vol. CXXIII No. 7 & 8
July/August 2003

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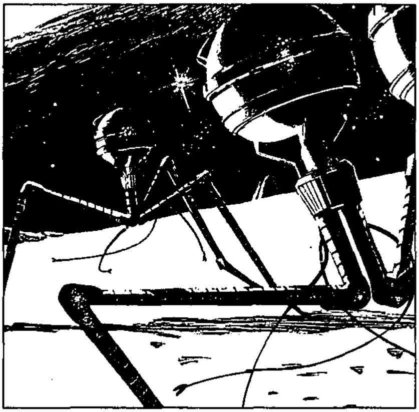

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A FRAGILE CORNERSTONE

The greatest achievements of civilization may not be towers or statues, empires political or economic, material wealth or technological prowess. Rather they are intangibles like respect for individual freedoms and differences, the opportunity to choose from a wide variety of careers and lifestyles, and the ability to enjoy the fruits of far more kinds of labor than any one person would have the time or talent to practice. Hardly anybody is able singlehandedly to build a car *and* an airplane, learn to operate both, build and maintain a house with good plumbing and electricity, raise all his own foods, prepare them in the fashions of many cultures, and personally administer whatever medical attention and education his family needs. But an advanced civilization like the United States can support people who specialize in doing all those things and many more, thereby making them available even to people who can't do them personally.

Thus a great many of us can live in a decent house or apartment, drive our own car(s), fly to distant destinations when we need or want to, eat a wide range of foods both at home and in restaurants, stay as healthy as our genes permit, and get a good education. That education can enable us or our children to pursue all kinds of options, including ones quite remote from our origins. The same farm family might produce a minister, a chemist, an auto mechanic, and a politician. All of those may disagree radically in their political, economic, or social views, and feel free to say so openly without fear of "punishment."

Underlying all those opportunities is perhaps one of the subtlest intangibles of all: an essential but fragile cornerstone called trust. Even people who think of themselves as habitually distrustful rely far more than they may realize on being able to trust strangers. The confidence to express an unpopular opinion requires either great courage or the belief, borne out by experience, that others will show you the same tolerance you show them. When you eat in a restaurant, you trust strangers to handle and prepare your food in a safe way and not to poison you. When you go to the doctor, you trust him or her to be competent and to give you the best treatment possible. When you accept a check as payment, you trust the payer to have funds to back it up—and not to do anything sneaky like stopping payment before you can cash it. When you board an airplane, you trust the pilot to be well trained, skillful, and conscientious—and you trust your fellow passengers not to smuggle bombs aboard or hijack the aircraft and turn the vehicle itself into a bomb.

As the last example painfully illustrates, trust (at least in strangers) can never be absolute, and you seldom place your trust *entirely* in the strangers themselves with whom you deal. Even if most people in a civilization usually feel safe (as they should, if the civilization is reasonably healthy), exceptions occasionally happen. Once in a while somebody *is* shot or poisoned or stoned for saying something that offends somebody, or somebody gets food poisoning in a restaurant. Some people do write rubber checks, and doctors have been known to operate on the wrong limb—or even the wrong patient. Some planes have been hijacked, in a few cases with spectacularly murderous intents and effects.

To reduce the likelihood of such harmful anomalies, our culture has instituted a system of controls—things like laws against violent expression of intolerance, and penalties for violating them. Boards of health inspect food packagers, grocery stores, and restaurants, imposing fines or suspending permits for establishments found engaging in unsafe practices. Banks penalize customers for writing bad checks, and federal insurance protects (some) depositors from unscrupulous or foolhardy bankers. The Federal Aviation Agency defines stringent requirements for who will be allowed to fly airplanes. Various screening agencies have long sought to make sure that dangerous passengers, or objects that could be used as weapons, are not allowed aboard planes.

All of these practices reduce our individual need to trust other individuals whom we don't know personally, but they still require us to trust our governments and the individuals who compose them. Most of us would probably agree that the less we have to depend on governments, and the more we can trust most *people*, the better off we are. A low crime rate is commonly regarded as a pretty good indicator of a society's health, but it may only be reliable if it's low despite people's being left to their own devices. If the government gets directly involved in controlling people's behavior only by punishing misdeeds (as suggested by the phrase "innocent till proven guilty"), and misdeeds don't often happen, that says something good about the people making up the society. If the government instead directly monitors and supervises everybody's actions to make sure they *won't* misbehave, the lack of misconduct tells you very little about the people's moral character. But it does tell you that the government doesn't trust its own citizens, which is hardly a healthy situation.

For some years I've been noticing a general erosion of trust and trustworthiness in our own culture. Sometimes it shows up in little ways. Halloween as a childhood entertainment seems to be dying, at least in some areas, because a few twisted people have tampered with the "treats" they give out and made parents afraid to trust anything their kids might bring home. I've noticed a trend toward restaurants requiring a phone number, and sometimes even a credit card number, when they take a reservation. Similarly, orchestras increasingly require a substantial deposit check to be sent with an audition application, to be

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returned when the applicant comes to the audition or a decision is made not to invite him or her. Restaurants and orchestras would not be doing these things if they had not had a problem with frivolous reservations and applications—people who make an appointment and then don't bother either to show up or to cancel.

Sometimes the erosion of trust shows up in bigger ways. Admittedly, sometimes there are special reasons for what happens, but when those lead to large changes in our way of life we must make a special effort to keep in mind why we are making them and to what extent and for how long we should keep doing so. For obvious reasons, air travelers have recently been subjected to unprecedented levels of preventive scrutiny, with everyone now effectively being treated as guilty of planning sabotage until proven innocent. Where once it was possible to board a plane by doing little more than showing a ticket, any passenger can now expect to have to show up at the airport long before flight time and show multiple documentation at several security checkpoints. Luggage allowances have been severely restricted. Carrying film—an important part of many people's vacation experience—has become risky business. Any semblance of privacy concerning what you're carrying is not even a possible dream. Your luggage *will* be scrutinized by x-ray, and quite possibly also by multiple strangers running their hands and eyes through it. And you can never be sure what seemingly innocuous object you dare not carry aboard for fear that someone will confiscate it.

For the time being, at least, many people are accepting all this quite willingly, sometimes even enthusiastically. We clearly are in a time of special risks, and more than usual precautions are necessary to counteract them. The Transportation Security Administration officers I've dealt with have generally seemed efficient, professional, and polite, if occasionally a bit *too* thorough. (Was it really necessary for one to call over a supervisor to determine whether my tie clip was a lethal weapon? And what can they possibly have hoped to find by running a scanning wand slowly and repeatedly over my bald pate? Perhaps such incidents can be attributed to the newness of the system and will become less common as everyone gets used to it. . . .) But the fact remains that

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this kind of scrutiny is very foreign to the political climate Americans have traditionally associated with their country. While most of us can appreciate the need to accept and cooperate with it now, it remains a legitimate subject of discussion to inquire how far it should go and how long it should last.

For now, many people are quite content with the kind and level of precautions; some would welcome even more. But bear in mind that most of these being asked how they feel about the new security measures are those who *are flying*—and many people still are not. Airlines are suffering severe economic problems, trying with limited success to regain business lost to fear. How many of those still not flying are making that choice because they're afraid, and how many because just getting to a plane has become more hassle than they're willing to go through? I don't know, but the question needs to be considered. As this example illustrates, a climate of distrust has far-reaching consequences even in purely economic terms.

And, of course, airplanes are not the only medium through which terrorists can do their dirty work. It's impossible to eliminate *all* danger, but it would be technologically possible to eliminate a lot more of it by expanding governmental surveillance through all areas of life. How much of that kind of enhanced security is worth how much of what must be given up in return? I have heard some people seriously advocate doing away with privacy altogether, making wrongdoing impossible by making any secret activity impossible. I've heard others say, "Fine with me; I have nothing to hide." But can we really justify imposing a goldfish-bowl life on everyone, or can we still allow choice? My own present response is, "If you want to live your life in front of a webcam, fine. But you are *not* welcome to demand that I do the same." (Robert J. Sawyer, in his novel *Hominids* [serialized here in January-April 2002 and later published by Tor Books], proposed a thought-provoking variation on this theme in which everyone's every act was recorded, but the records were closed unless a compelling reason arose to examine them.)

The present heightened security measures are justified by an extraordinary external threat, but they are not unrelated to the present general erosion of trust. One can hope that in a few years the acute threat will have been eradicated, and that we—including our government—will then remember that these measures were instituted "for the duration" and that the time has come to relax them. But "when" and "how much" will remain debatable questions. I anticipate that some, having become used to extreme security and remaining driven primarily by fear, will want to keep all measures in place indefinitely. They will be able to point out, quite correctly, that once the capability exists for small groups to commit large-scale mayhem, the possibility will always be present. But I hope they will recognize that its probability is much lower in some times and places than in others, that one can never be *absolutely* safe, and that at some point the magnitude of risk must be weighed against the inconvenience and other costs of guarding against it, and some sort of balance struck.

The less we must depend on governmental micromanagement, and the more we can depend on the high probability of most people simply behaving decently, the better off we'll be. That requires widespread trust, and that works as a survival characteristic only if we have widespread trustworthiness. I'm not sure how to cultivate and maintain that in a large, diverse, complex society, but learning how is one of the most worthwhile things we could learn to do. At least part of it, I strongly suspect, involves education; and by that I mean not just what goes on in classrooms, but what goes on in every home, church, temple, mosque, and workplace. Large numbers of people are most likely to de-serve trust, and to extend it comfortably to each other, if each of them understands at the very deepest level that it can work if and only if the vast majority of them habitually treat each other honestly and fairly—and that that requirement applies first and foremost to everyone's own self.

While writing this, I tried to place a telephone order for a pizza, which I expected to pick up in the usual twenty minutes. I was told that the pizzeria was no longer accepting phone orders for pickup and I would have to come in, place my order in person, and then waste twenty minutes waiting there—because they had too many juvenile pranksters placing orders they had no intention of picking up or paying for. Why was no one able (did anyone even try?) to make those kids understand that the inanities they find so amusing will make life more expensive, inconvenient, and unpleasant for everyone—including themselves?

That kind of understanding, and the behavior that follows logically from it, are not easy things to instill into a whole population. But any civilization that can't learn to do it had better be prepared to be replaced by one that can. ■

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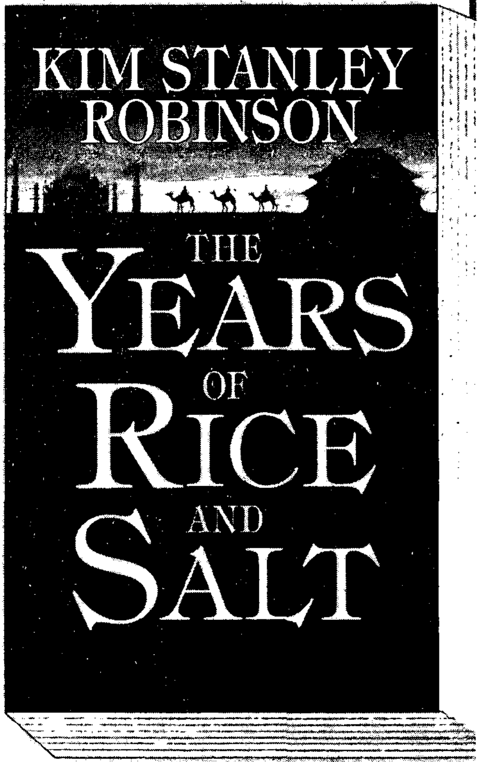

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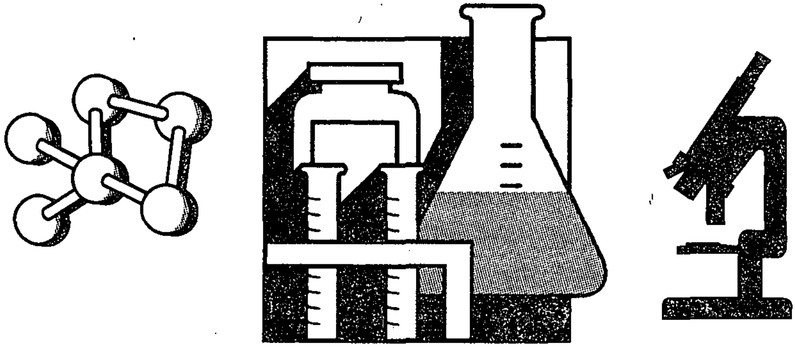


It's time once more to thank all of you who voted in our annual poll on the previous year's issues. Your votes help your favorite writers and artists by rewardin them directly and concretely for outstanding work. They help you by giving us better feel for what you like and don't like—which helps us know what to offe you in the future.

We have five categories: novellas, novelettes, short stories, fact articles, and covers. In each category, we asked you to list your three favorite items, in descendin order of preference. Each first place vote counts as three points, second place two and third place one. The total number of points for each item is divided by the maximum it could have received (if everyone had ranked it #1) and multiplied by 10 The result is the score listed below, on a scale of 0 (nobody voted for it) to 10 (everybody ranked it first). In practice, scores run lower in categories with many entrie than in those with only a few. For comparison, the number in parentheses at the head of each category is the score every item would have received had all been equally popular.

We must apologize for a bit of inadvertent confusion in one category. Due to communication mix-up discovered too late to fix, the print and online versions o the ballot for Covers were worded differently, with the former in effect asking you to pick your favorite cover, and the latter asking for favorite cover artist. Since a large majority of votes were cast online, we went with that version and made our best effort to translate the paper votes to that system. There may be some resultant uncertainty about the ranking of the runners-up, but the winner had such a strong margin either way that we're confident he deserves his award!

* * *

NOVELLAS (4.00)
1. "In Spirit,"
Pat Forde (4.59)
2. "Sidehunter,"
Rajnar Vajra (4.51)
3. "Unseen Demons,"
Adam-Troy Castro (4.39)
4. "Presence of Mind,"
Edward M. Lerner (2.86)
5. "Tiptoe, On a Fence Post,"
Brenda W. Clough (2.16)

NOVELETTES (0.87)
1. "Look Away,"
Stephen L. Burns (2.02)
2. "Mammoth Dawn,"
Kevin J. Anderson &
Gregory Benford (1.70)
3. "Truck Stop,
Walter F. Cuirle (1.60)
4. "The Great Prayer Wheel,"
Rajnar Vajra (1.52)
5. "Slow Life,"
Michael Swanwick (1.31)

SHORT STORIES (0.53)
1. "The Hunters of Pangaea,"
Stephen Baxter (2.11)
2. "Forget Me Not,"
Amy Bechtel (1.61)
3. "For Love of Amanda,"
James Van Pelt (1.16)
4. "It's Only Human,"
Brian Plante (1.05)
5. "The History of Chan's Journey to the Celestial Regions,"
Richard Foss (1.02)

FACT ARTICLES (1.82)
1. "Galactic Society,"
Robert Zubrin (3.25)
2. "A Question of Immortality," (2.42)
William Sims Bainbridge, Ph.D.
3. "Beyond the Periodic Table: Artificial Atoms and Programmable Matter,"
Wil McCarthy (2.17)
4. "The Tell-Tale Brain: The State of Neuroforensics,"
Kyle Kirkland, Ph.D. (1.71)
5. "Are We Afraid of a Little Fire? Exploring Space May Require Nuclear Rockets,"
Dr. Steven D. Howe (1.67)

COVER ARTIST (2.86)
1. David A. Hardy (5.11)
2. Dominic Harman (4.50)
3. Vincent Di Fate (3.81)
4. Frank Kelly Freas (2.77)
5. Randy Asplund (1.43)

Novellas were a surprisingly close race this year, with "In Spirit" and "Sidehunter" running neck-and-neck and often switching places as additional votes came in, with Adam-Troy Castro's "Unseen Demons" never far behind. Special congratulations to all three writers! All other categories had clear first-place winners.

The number of votes was down a bit because of some problems with e-mail, but we hope that was a one-time occurrence and online voting will be back to its easy, reliable self next year. Since Anlab votes are so useful to everyone concerned, we hope to get more votes than ever next time. Use e-mail or "snail mail," whichever you prefer, but please vote! (And please be careful to vote in the right category, as listed in the annual Index. Sometimes a few votes are wasted by being cast in the wrong category, and those simply can't be counted. If you didn't use the online voting on our website [www.analogsf.com] this year, you might want to try it next time; it makes that problem virtually impossible!) ■

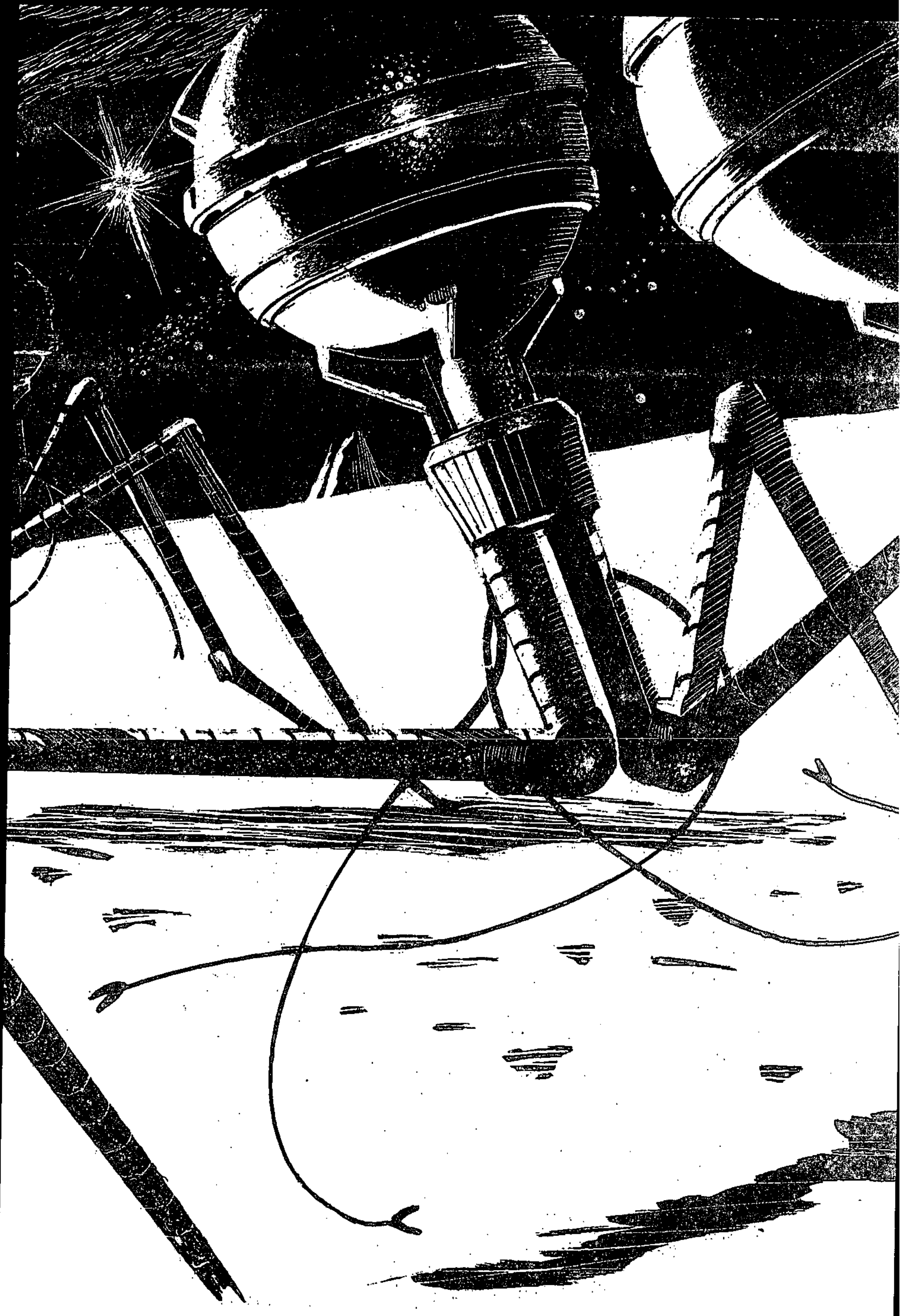
Robert B. Streifthan, of Centerville, OH, is this year's winner of a free one-year subscription in a random drawing from all ballots received. Next year that could be you—and the more votes we have, the more the results mean!

THE FIRE and the WIND

G. David Nordley

Illustration by Vincent Di Fate

An alien world poses new and daunting challenges—and "alien" depends on where you start.



In the dead, dark stillness outside, the temperature continued down below 200 K. The high-tech tent provided some protection, but it was designed to have more thermal input than the body heat of six huddled people. There was no more fuel for chemical heaters and the small electric heat pump was silent, every erg of battery power long since drained. The only energy left powered the bodies and minds of the survivors. Each, in their own way, concentrated on one thought. Endure. Endure. Only one of them felt betrayed.

I'd just turned thirty and gotten tired of lunar geology. We knew where the ice was. We knew where the carbon was. The real action was Mars and beyond, or in to Mercury, but for that I needed some space time. So I'd figured a four-year stint and a few training missions with the CLR Space Service would punch those tickets.

Classwork, of course, came before the missions.

"In space, you think of oxygen as a friend; you can't live without it. But it can be your worst enemy. You may think you can't get enough of a good thing, then a spark and you're toast."

Our lecturer, Captain Avia Martinez, had our full attention. There was a dark authority in her voice and a gravitas to her bearing that made me forget she was under 160 cm tall. Her English was careful and her accent mainly North American, though with the ineradicable tendency to pronounce her "i" a beat longer than a native would.

We all knew her story; she'd been a combat nurse in the Mexican army during the 2028 insurrection, a purser's mate on the first passenger line, a heroine of the Lunar independence movement and more than once since on various rescue missions as the fledgling republic took over from the UN space authority. She was also a close friend of the legendary Captain Sally Duluth, CLR President Lisa Reynolds, and defense minister George Samios—about as high up as there is room to go in the fledgling Cislunar Republic pantheon. For the last year, Martinez had been responsible for search and rescue over most of known space. We were lucky to have her.

A hand went up; Zander Yurovich, our beefy class skeptic. That was followed by oh-not-again groans among some of the other students, which he cheerily ignored.

A somewhat forced smile flickered across the captain's face and she nodded to him.

"Computers tell you if problem," he stated. "I am electronics expert, I know this."

The other ten of us sat in an embarrassed silence deep enough to hear the whisper of air moving through the ventilation ducts. That made me think of safety and lunar society; there was no need for the ventilation to be noisy enough to hear, other than that *not* hearing it would be a warning. You grow up a little paranoid on the Moon.

I smiled to myself; side by side he and Captain Martinez were an almost comical contrast: she small, intense, dark-eyed, buffed and the exemplar of lithe—he pink, blond, and bloated.

"In the seven emergency calls since the founding of the service," Captain Martinez answered, "the target spacecraft or spacesuit computer was damaged or down completely and the people inside were often shielded from their own ship. Things can happen *pronto*, too fast for you to stop to ask a computer. Inside, you can glance at your wrist, maybe. You must *know* this! Generally, 0.1 bar oxygen is too little, 0.6 bar is too much."

"The *Lucky Leo*—" someone said and stopped as Captain Martinez held up a hand. She ran a tight class; you were expected to keep your mouth shut until you held the floor. *Especially* while she held the floor. But the name of the spacecraft was enough; there were nods and murmurs in the class.

She nodded. "*Sí*, the *Lucky Leo*. Interior view please, after salvage."

The holo stage behind the captain became a larger-than-life view of the inside of a spacecraft command deck. Clean, bare metal.

"This was a debris strike to start with," she said, "one that hit the emergency suit hook-up oxygen line. Unfortunately, a redundant safety valve upstream of the distribution valve jammed open. It probably hadn't been exercised since installation. Once they got the entrance and exit hole plugged, the oxygen partial pressure probably hit one bar.

"The fire started in the airlock controls and flashed through the cabin in about seventy seconds, incinerating the temporary patches. That kept the cabin from exploding, but everything combustible in any way was turned to ash and vapor and blew out the holes. What you see is bulk aluminum and titanium coated with their oxides; everything else—plastics, composites, thin wires, and, of course, anything organic—was gone in seconds."

I stared at the sterile shell. Five people had been in there. Somehow, that was even more unsettling than a charred corpse. I imagined being simply erased in an instant.

"That is probably a good place to end this session. Keep that image in mind. Now, I have the standby scramble ship duty selections for those of you who have qualified. Jones, Levine, and Ghandhari go with Lt. Rae on CLR-20. Baklanova, Petersen, and Kiwidinok, go with Captain Reynolds on CLR-23; and Yurovich, Kent, and Yu will be on call with me on CLR-18. Have your kits on board by 1800."

That woke me up. Being "on call" meant the chance for a real mission. It also meant the captain thought my course work to date meant I wouldn't be a liability. I wasn't surprised at Kristine Kent, a cool and competent South African refugee raised in London, but Yurovich was another matter. His constant questions and haphazard English had him down as the class clown to a lot of people. But his scores must have been a lot better than that indicated, or he wouldn't have been here.

Zander was at the CLR-18 when I brought my travel kit that evening. He gestured to the spacecraft hanging from its fore and aft hard points.

"Looking like movie ship," he said. "Round and smooth. Real spaceships look like some soccer balls and sausages in erectors set."

I grunted. "Zander, the aeroshell is so it can use Earth's atmosphere to change course, if needed."

He shrugged. "*Da*, I know this. Still look strange."

Compared to the usual cislunar ferry, it did. The nose was wedged for minimum drag and the long, thick, stumpy "wings" that held the launch track suspension magnets were fully enclosed and had real control surfaces. Its orbital maneuvering pods were high on the rear, another aeronautical contingency adaptation.

A climbing pole thrust five meters down from an open circular hatch in the belly, forward of the main engine bay. Zander gave me an "after you" gesture, so I slung my kit over my shoulder and pulled myself up. Zander didn't bother with his shoulder strap; he jumped almost halfway, grabbed the pole with one hand and thrust his bulk up, popping up through the hatch like a breaching whale.

"We get called tonight," he said. "I know. I have a date tomorrow."

I smiled and shook my head. Zander's future universe was always a dark one. But the CLR rescue service was only getting about two missions a year. While nothing was absolutely safe, space travel was getting there. The few missions that did occur got so much publicity that it obscured the fact that hardly anything ever happened; but the Republic looked on the rescue service as a reservoir of high-performance spacecraft and crews for any contingency.

"You see. They train us, no? So they create something and not tell us is not real. But we know and we play." He grinned and slammed me on the back with a huge hand. "Just like is real, yes?"

"Sure, Zander," I said. "Just like is real."

"Hey, maybe we go to Saemahahn? You'd like that?"

I groaned. My oriental surname and a slight epicanthial fold were the second curse of Abraham Yu, the first being "Hey, you." I played dumb. "Why?"

"Why? New Korea at L4!"

"Zander, my folks are mostly New England Yankees, almost back to 1640. The great-great grandad I got my surname from came from Hawaii on a returning missionary ship; he was Chinese, not Korean, and not 100 percent of that."

"Oh." Zander shrugged. "Good food at Saemahahn, anyway."

"Well, they would have that. Let's get this stuff stowed."

We followed the pole up to the control deck. The cabin layout was compact and simple, a tube seven meters long and six meters wide. The lower deck was for storage or passengers and the upper deck for crew. The control deck was about three meters long and consisted of two rows of three swivel chairs. Video display panels covered the walls over the chairs, but those were backup. Helmet visor displays were now the primary interface.

The captain's cabin was in the odd rounded space in the nose of the pressure hull just aft of the attitude control cluster. The door was open, so, out of curiosity, I stuck my head in. A maximum of two meters long, it held a folding single bunk that left room for a very small group of people to meet privately, a microgalley in the extreme front, and a microhead in the corner across from the bunk.

It seemed roomier than our virtual trainer and it took me a moment to realize why. The bunk was folded up and there were no personal effects whatsoever. There were no bolt-down furnishings, no items in the aerogel cabinet, no rug and no wall decorations. This had been Captain Martinez' ship for over two years, and there was nothing of her to be seen.

Spartan? Her demeanor in class would be consistent with that.

Or maybe it was psychological—in a crunch, the ship was expendable and she didn't want to have an emotional investment in it. That would be consistent with it having no name.

"Is problem?"

"No, Zander, no problem. Our captain likes things simple, it seems."

"*Da*. I think she has bruised soul, almost like Russian."

"Maybe."

We went aft to the crew quarters. Three tiny compartments, two meters wide only at floor level, formed a U at the rear of the cabin. Each compartment had two swing-down bunks, but two compartment doors were locked, leaving me with only one choice.

"You room with me?" Zander said.

Rooming with Kristine would be much more pleasant. She was the most beautiful woman I'd ever seen, and one of the smartest. But that was a fantasy; I hardly knew her well enough to suggest it, and, besides, the odds were that we'd never leave port. I agreed to be agreeable and tossed my kit into the bin at the tail of the lower bunk in the open compartment.

"*Nyet*. You take upper bunk."

"Hey, Zander . . ."

"Look at me, *Da*? Main rocket in ship's belly; what if they not take time to wake us up before they pull two gravities."

I visualized Zander falling down on me from the top bunk at two gravities, smiled and retrieved my kit. "There is no avoiding all inconveniences in human affairs," I told him.

"Kung Fu Tse?" Zander asked.

I groaned. "Adams, Zander. John Adams. One of my fatherland's early leaders."

"Oh."

We met Kristine on our way out. She wore immaculate white coveralls relieved by a small Cislunar flag. The coveralls opened at the neck just enough to show that her skin-tight white shipsuit was fastened all the way to her throat. The effect was high Victorian in pants and left me as curious as I imagined any teenager might have been as to what lay beneath. This in a culture that had long ago discarded swimsuits as excess mass.

"We've taken the last two bunks, it appears," I said, grinning like an idiot. Someone a little more on top of the situation might have said, "But I will be happy to make other arrangements." But being me, I just stood there dumb-faced.

That gave me time to notice that she wasn't carrying a kit.

She smiled charmingly and said in a bell-like voice with her Mary Poppins accent, "I've already made my arrangements, thank you very much. I returned to add today's lecture to my spare comcomp." She displayed a data wand. "A nuisance, but it has to be done in person. The ship is well shielded here, have you noticed?"

"We can go to Mars, if needed," Zander said.

Kristine laughed melodiously. "Yes, Alexander, we could, though I'd think we'd grow quite bored with each other's company in the months that would take."

I sighed. I wouldn't be that much of a bother to her. My last romantic liaison had been with a lady astronomer who had been cheerfully sleeping with two other guys as well. Then she left all of us for a berth on the Ceres expedition. Though she'd constantly told me to develop other relationships, keeping up with one third of her appetite had been about my limit. Nonetheless, this mysterious lady in white was now standing in front of me and my heart rate was elevated.

Hormones overcame fear of embarrassment; I had to say something . . .

"Kristine, given that we're not likely to get to know each other that way, perhaps we could have dinner at Duluth's some night." I sounded like a goddamn idiot.

She laughed and touched my arm lightly. It burned where she touched.

"Sorry, but I'm not the dating type, am I? Moreover, I must study every night until this course is over. Someone's life might depend on it—perhaps yours. But thank you for the thought." She tossed her head toward one of the other compartments and flashed a gigawatt smile. "Please excuse me for a moment."

She turned to one of the other compartments, opened the door and slipped in with the grace of a fawn, leaving only the scent of a fresh spring breeze.

While the door was open I caught a brief glimpse of two signed portraits in her compartment: one was of a blond boy of about five with a bright smile in a school uniform of white shirt and blue shorts; the other was of a lunar icon, but the inscription on the photo didn't say "to Kristine," it said "to Avia."

Zander frowned. "Admiral Samios? She knows Admiral Samios?"

I read English faster than Zander. "It was inscribed to Captain Martinez; it looks like our captain is rooming with Kristine."

Zander looked toward the captain's stateroom toward the bow. "But . . ."

"I like to leave the forward room free for meetings, or as a surgery, if needed." Captain Martinez appeared at the door, looking very serious. "Do you have everything you need aboard? Yes?" she asked.

Zander shrugged. "*Da . . . Nyet*. One never has everything."

"Hmmm. You are learning, maybe. Well, what you have will have to do, because we are going somewhere. We must get ready for launch, *pronto!*"

That was why she was here in person. No sooner had she said it, than I heard the clang of the port's macrowaldos attaching themselves to the hull, ready to lay the CLR-18 on the launch track like a round in a rifle. I turned to scramble for my seat and bumped into Zander, who stood there like a block of Siberian permafrost.

"We go where?"

"Zander," I said quietly. "Move."

"We go where?!" he said more loudly.

"Ensign Yurovich, you have five seconds to take your position, or go out the hatch," Captain Martinez said almost as quietly as I had, but the words seemed to echo off the hull.

Zander scuttled back into the main cabin, looked up at his station on the raised platform on the left side, looked down the exit pole, hesitated, and then with a grim expression pulled himself up to his acceleration seat.

"Ensign Yu . . ." Kristine said.

I'd been frozen watching Zander's personal drama and was now blocking the passageway myself. "Uh, sorry."

I jumped for my seat and began to strap in and run through my checks. The ship was entirely computer-controlled, with five redundant nodes, each fully capable of running the ship, but the captain, last out of the passageway, had somehow settled in and called out "Command ready" before any of us. I couldn't see her; her station was in front of mine, and the back of her seat blocked my view.

My lights were all green. I reached up, flipped open my locker and did a visual on the various environmental packages: black for vacuum, gray for lunar surface, red for Mars, and in the spare slot, there was a white package. White?

"Station 3, ready," Kristine sang out.

The telltales on all my packages were green. I checked my straps.

"Station 2, ready."

"What's the white package for?" Zander called out.

"Yurovich . . ." The captain's voice held the hint of some extreme doom for Zander unless he responded quickly.

"*Da*, it has a green light, whatever it is."

The ship settled into the launch cradle with a couple of thumps.

"Station 4 ready," Zander finally said.

"CLR-18 ready," Captain Martinez said.

"Okay, is exercise over now?" Zander asked.

The CLR-18 leapt forward and my seat pushed my reluctant body along with it. The seat swung toward vertical as the g built up to the track standard of 30 meters per second squared and felt the slight rocking motion as the ship's magnets lifted it off the cradle. Three g was bracing—eighteen times my usual weight, but like most lunies, I'd been pretty good about maintaining my high-g certification.

We had pills for calcium loss, but pills can't exercise for you and no matter how much I tossed hundred-kilo medicine balls around, my arms still felt like lead when I lifted them out in front of my body.

I glanced across the passageway. Kristine was doing what I was doing, but Zander looked grim and seemed to endure the acceleration rather than play with it. I selected "side view" and watched track supports whip by with increasing frequency as the distant gray hills majestically glided aft. My weight began to fall away as Ft. McHenry came into view, silently chuckling at the irony of its name as I did each time I passed this maintenance outpost on the rim of Congreve Crater.

Across the passageway, Zander lay flat, pale and breathing heavily. Only his eyes moved.

"What is so funny?" he wanted to know.

"Just the name of the maintenance base."

Kristine looked over as well; "Well?"

"I would like to know, too," Captain Martinez said sharply from in front of me.

I realized that I was the only one of U.S. ancestry in our crew. "History. It goes back to the War of 1812. The British bombarded Fort McHenry, near Baltimore, with Congreve rockets. It didn't fall, so they bypassed it and sacked Washington. But they didn't stay with a hostile force at their rear. The whole thing was kind of pointless, but it provided that "rocket's red glare" phrase in the U.S. national anthem."

"Glare wastes energy. Only time rockets glare red is in an emergency," Zander said. "1812. Napoleon. U.S. on wrong side of war. Russian view, of course."

From the Russian perspective, I realized, my ancestors had been on the wrong side of a world war. I thought of another irony—playing Tchaikovsky's 1812 overture on independence day.

Kristine laughed. "The British view as well, but I think I get the point. Congreve and Ft. McHenry were on opposite sides of the Napoleonic wars, but are now together on the Moon. I suppose it's as hard with nations as it is with people, but one must, eventually, let go of such things, mustn't one?"

"An irony, indeed," Captain Martinez said. "Now, if any of you have any business to clean up back on the Moon, it is the time to do it. Our ETR is ten days."

A chill went down my spine and the small cabin was suddenly silent. They tell you when you sign up that we are primarily a search and rescue service, but that we are also part of what passes for the Cislunar Republic's military. Things hadn't entirely calmed down between the CLR and Earth's International Space Authority—particularly over the issue of self-determination for the population of the big L1 manufacturing complex. The United Nations had yet to formally recognize the new Lunar government and only a handful of member nations had done so. Some wanted to "reclaim" what they felt was partly their property.

"What happens now?" Zander asked. "Where do we go?"

"Ensign Yurovich, simply tell whoever you talk to that you haven't been briefed yet, but you'll be back in ten days. Please make it sound routine."

Another silence. I had questions of my own, but it was clear they wouldn't be welcome just now. Kristine was already quietly talking to someone on her board. What had I planned to do in the next ten days? Dad and Mom were on Mars . . . I'd just broken up with Cynthia . . . Rolf Petersen might be going out as well . . . Cousin Todd would be in his office. I touched-in the code. He was busy, but his cyberservant took my message.

Zander was saying something in Russian and getting increasingly agitated, finally ending his call with a "*Do svidanya!*" that echoed through the main cabin.

"Bah! Mother asks too many questions I cannot now answer."

I struggled, with limited success, to keep a straight face. However, Kristine, whom Zander could not see, grinned from ear to ear, doubled over, and then clamped her hand over her mouth so all that escaped was a faint lady-like cough.

"Are you all done?" Captain Martinez asked.

"Yes," I said.

The others nodded.

The captain floated out from her station into the middle of the passageway. "We are on total radio silence as of now. No calls until I lift it. Settle in and then join me up front and I will tell you what this is about."

The core of a CLR service spacecraft is a pressure cylinder five meters in diameter; the epimenage of magnets, heat shield, stub wings including fuel tanks, and a small external cargo area are built around that. The upper half of the cylinder is taken up with life support equipment, mission gear, and a small air lock. The command deck is the lower middle of the cylinder, with the "staterooms" and a head at either end. If spun on its axis at eight rpm, a CLR/SS can generate almost a lunar gravity for a passenger seated on one of the heads. It's comfortable enough as long as one doesn't move quickly in a radial direction, though the force of gravity on my feet was noticeably greater than that on my head. It makes it far more convenient and quicker than trying to do one's business in the zero-gravity mode.

I was the last one into the tiny stateroom and I squeezed into the open space around the table next to Zander. The tabletop was active, but displayed what looked like a featureless white plain.

"Antarctica, Abraham," Zander said, looking utterly miserable. "We go to Antarctica!"

The white kit in my locker. I looked at Captain Martinez.

She nodded. "The Hemstead expedition has had an emergency."

The Hemstead Expedition, a half-dozen people trying to cross the continent on the surface during the Antarctic night for the first time.

"What kind of emergency?" Kristine asked, suddenly looking very concerned.

"Their two vehicles are trapped, simultaneously, in a crevasse—a freak accident, they say." Captain Martinez sighed. "I say that in this day and age, properly equipped, you don't have those kinds of accidents. Anyway, they lost almost all their fuel. They've huddled up to wait for help. We will happen to be in the best position to rescue, when it is announced."

"Is UK expedition, yes?" Zander asked.

"Commonwealth, staged from Australia. But two of the six are lunar citizens—Sam and Sue Reynolds. The Brits called us, ostensibly to show what we can do and make some political hay for their recognition policy."

Zander groaned. "So we go get killed maybe rescuing President Reynolds' British friends."

The British world had supported Lunar independence long before anyone else, and maintained good relations, while most other countries kept the Republic at arm's length, dealing through the UN-chartered International Space Authority, the ISA. Sam Reynolds was a distant cousin of Lunar President Lisa Reynolds, which probably did have something to do with him and his wife taking on such a risky mission. Then something else Captain Martinez had said earlier suddenly came to mind: 'We *will* be in the best positions . . . when it is announced.'

"They want us to rescue them, as opposed to someone on Earth?" I asked.

She nodded.

"But they would be risking lives to arrange that, wouldn't they?" Kristine looked puzzled.

The captain nodded again. "The British, they did not arrange the accident, but someone else, maybe *they* did. The expedition crossed a dry part of Antarctica, here." She pointed to a gray area that expanded into a mountainscape on the table display. Lunar mountains are desolate, yes, but they seem like warm, sunny hills compared to that.

She looked at us as if she were searching for something, testing us. "The rest is something you must never tell anyone. There is a large, *secret* base in Antartica—well hidden, but we have space-based surveillance data. We think it is a weapons research lab, operated by the ISA. The Hemstead expedition path was plotted to go near it."

Kristine looked at Captain Martinez. "A UN base making weapons to use against *us*?"

I bit my lip to keep silent. George Samios was probably cooking up something in a similar off-limits area near Perry Crater at the lunar North Pole. It was not something I was supposed to know, but I'd never taken the rumor very seriously, until that moment.

Captain Martinez shrugged. "The ISA operates under a UN charter, but it funds itself by special member contributions and pass-through duties at L1. In theory, the Security Council could revoke or amend the charter, but the Chinese have vetoed every move in that direction."

There had been a lot of unhappiness over Cislunar independence. Some people had lost the opportunity to skim something off the burgeoning flow of goods and materials from the Moon. Others had lost power and influence, and didn't know how to let go.

"Until the UN does assert control, Mr. Barman, the ISA administrator, is a law unto himself and cannot be stopped." Captain Martinez tapped her foot, and there was fire in her eyes, as if there were something personal in this for her. "The Secretary General can issue orders, I think, but without budget power over Mr. Barman, the latter can simply smile, say 'yes sir' and continue doing what he is doing."

"Oh no you don't," Zander said. "The Reynolds are spies, then, yes? But Alexander Mikhail Yurovich is not spy. Is not going to spend rest of life in Earth prison. *Nyet!*"

Kristine's face was white. "Avia, pardon me, Captain, my ex is on that expedition. Timothy Lynn Richardson."

The captain shut her eyes for a moment. "A complication. But this is okay, I think. You will rescue your ex-husband. We can publicize that to draw attention away from other ideas."

"You don't understand. It was less than amicable, I'm afraid. Sorry to be such a nuisance."

The picture of the little boy in the cabin . . . a son? She'd never mentioned anything, no child care, no school reports. Maybe too young for school. I started to adjust my fantasy life; she was beautiful, I wanted her, but was I ready to be an instant father?

"Bad luck," I said.

"Both adventurers." Zander said. "Are only so many. Eventually paths cross. Bad omen."

Captain Martinez was silent for a moment. "I am the reason this ship was chosen, not you. You three are only *el sorteo*; there was no time to pick crews. Ensign Kent, I am not sure how hostility will play, maybe . . . no. You will be professional and he will be in too much shock to cause trouble, I think."

"Is no problem. We abort, they send someone else. I, Alexander Mikhail Yurovich, will insist on this."

He was making an idiot out of himself. "Enough, Zander," I said. "We have a mission."

"Thank you, Ensign Yu. Yes, we have a mission," Captain Martinez said. "We are going to land and serve as a temporary shelter for the expedition members until other arrangements can be made once the Antarctic day begins. While doing that, we are to see that certain robotic equipment the Reynolds brought with them vanishes."

Zander threw up his arms, wobbling a bit from the Coriolis force as he did so. "Why do they not get rid of those things themselves?"

"Because they are currently surviving off the power supplies of that equipment."

"I suppose then it really wouldn't do for them to be rescued by anyone else, would it?" Kristine added.

"*Sí*. We need to do a speed-up burn as soon as we round the lunar horizon, in about six minutes. Now, stations everyone, *pronto*."

We slid out of the wardroom and filed out the door to the command deck

"We hit atmosphere hard, then?" Zander said, once we were ready.

"Seven gravities," Captain Martinez answered.

Zander pursed his lips, nodded, and said nothing more at all.

The speed-up burn was routine, a fraction of a kilometer per second. A similar, smaller burn had been done by the Apollo 13 mission over sixty years ago, I recalled. Our 30-by-40 array of high-pressure kilonewton microthrusters, barely ten centimeters deep, would have looked like magic to those old astronauts and they would be surprised to see us getting 3 km/s exhaust velocity out of moon-produced chemicals, but they'd recognize the principle immediately. Fuel and oxidizer burned under pressure and released through an expansion nozzle.

I wondered what James Lovell would have thought of the Moon today.

We turned in for a solid, drug-assisted ten hours of sleep after the speed-up burn. It might be the last good sleep we'd get until we were rescued ourselves. On rising, three of us gathered in the wardroom for breakfast.

"Missing Zander, aren't we?" Kristine said.

"He's checking out the cold-weather gear," I told her.

She laughed good-naturedly. It sounded like church bells to me. "I suppose he thinks that because he's Russian, he's an expert in the area. Well, he was born on the Moon just like you and to the best of my knowledge has never been to Earth, let alone spent a day in the snow, has he?"

"He is having a hard time dealing with this," Captain Martinez agreed. "Ensign Yurovich may have gambled on not ever having to actually do something."

"Gambled?" Kristine asked.

Captain Martinez pursed her lips, then said, "Punching the ticket."

I knew what she meant. A service record opens doors, and usually involves no real danger. Zander had barely passed the entrance requirements six months ago. He had not spend much time in the gym since that I'd seen; and now, by the luck of the draw, he was going to spend a week or so weighing six times what he was used to weighing. Courtesy of medicine, his bones would be strong enough, but muscles? That was an open question. I'd spent a couple of hours on the Coriolis Crater city's centrifugal track the previous week, and while I'd stayed upright, it had not been an enjoyable test. Only two hours, and I rated myself in much better shape than Zander.

On the other hand, Kristine and Captain Martinez were Earth-born and both looked to be in excellent condition. The captain had served with, and trained with, Luna's legendary Olympic weightlifting medalist, Sally Duluth. I had no doubt she was stronger than me. I really had no basis for judging Kristine's physical ability other than her looks; and she made such a point of being quite proper and lady-like, thank you, that I could hardly imagine her doing anything grossly physical. But there seemed to be not an ounce of fat on her one-and-a-half-meter frame.

My thoughts were broken by a roar and a string of Russian. A moment later, Zander barged into the wardroom, naked to the waist, carrying his Antarctic gear. In the minuscule gravity, waves of fat rolled up and down his torso in an almost cartoonish slow motion. There was nothing comic about his demeanor, though.

"Captain, we have more big problems. Boots are too tight."

"Ensign, they are almost identical to our vacuum boots."

"*Da*, that is problem! Vacuum boots need be tight, keep body from bloating. Insulation no problem, vacuum is great insulator. But snow and ice and wind are not like vacuum; they carry heat away very efficient. Blood needs room to flow to keep feet warm. Snow boots should be . . . *bolshoi* . . . big. Big enough so feet can move and keep warm. Other clothing too; sealed but loose."

Kristine chuckled and placed a hand daintily on Zander's big pink forearm. "I know where you were born, Zander Michailivich . . ."

"I was born Lunograd, so what? I have my grandfather's journals and I ask many questions about Siberia. He told me how to live there, should I ever have to. Tight boots are not good."

"Zander," I said, "the suits have almost certainly been checked out to far worse conditions than what we'll encounter . . ."

Captain Martinez held up a hand and looked very thoughtful. "I am a little sorry for radio silence now. I think I would like to check on the origin of this gear. To the best of my knowledge, we have no arctic simulation rooms on the Moon as yet."

"I have solution, to boot problem, anyway."

"We are still going to do the mission, Zander," Captain Martinez said, surprisingly gently.

"*Da*, not that solution. What we do is I give my boots to Abraham, he give his to Kristine, she give her boots to Captain. That way there are three of us with roomy boots and not-frozen feet."

"But what about you, Zander?" I asked.

He looked miserable. "One does not need boots when flat on back. But if I do, I use spacesuit boots from Mars kit. I take pressure liner out and replace with crumpled paper. My grandfather did crumpled paper in Siberia. Worked fine. Only good use for *Pravda*, he said."

Captain Martinez said, "Hmm. CLR-18, what is the insulation factor of crumpled newspaper, as compared to, say, aerogel?"

Zander was impressed enough with the difference to change his plans to aerogel.

It was Kristine who now looked concerned. "If Zander is right about needing to flop around in oversize boots, and the kit makers were wrong, one suspects that there may be other things wrong on this mission, doesn't one?"

Captain Martinez shut her eyes for a moment, then opened them. "This is not risk-free. The time to atmosphere entry is eighty minutes. Put the arctic gear on now; that will save us trying to do it in heavy gravity. We'll do what you suggest, Ensign Yurovich; there is some fast drying aerogel in the medical locker."

After hours of idleness, we were suddenly very busy doing everything we didn't want to be doing once Earth's gravity took over. Kristine went for the head and Captain Martinez slipped into their cabin.

I looked at the instructions for putting on the arctic gear and began to follow them, then stopped. Kristine had been ahead of me on that one—while there were arrangements for taking a piss while in the gear, one would rather not.

The ship began to lower its cabin temperature, mercifully. Even loose and open, the cold weather gear was very effective at keeping me warm.

"Atmosphere entry in ten minutes."

The announcement was punctuated by a couple of bangs of attitude control thrust and the abrupt cessation of any weight at all.

Where did the time go? I quickly grabbed and stowed the gear I was checking and strapped myself in. A glance at Zander showed him rigid and stoic, expecting the worst. I wasn't sure of myself either. Exercising under weights or in a centrifuge for an hour or so was not like the continuous real thing and I knew it. Our lunar mythology was founded on moon-born Sally Duluth going down to Earth and winning a silver medal at the '36 Olympics; that's how we thought of ourselves; tougher and smarter than they were, despite the low gravity. But the personal reality, I knew, was going to be very different.

"Atmosphere entry."

It began with a hiss that gradually became noticeable over the general hum of the ship's equipment. Weight sneaked up on me like Christmas as the hiss built up to a roar. It was very even, not jerky like you see in some films, just weight and more weight. A full Earth gravity, then three, then five, then seven; I couldn't lift my arm at seven, though I could lift my fingers easily enough.

Zander moaned, very softly. There was a slight burnt smell in the cabin, from who knows what. The weight backed off fairly quickly, five . . . three . . . one.

"When do we get down to one . . ." Zander asked, stopping in mid sentence as he realized we were already at one gravity, gliding like a stone at terminal velocity with the wind of passage beneath us equal to our weight.

"Our target has been acquired," the ship announced.

That would be the stranded expedition.

"Stand by for retrothrust in ten seconds, nine, eight . . . one."

Boom, rush, and roar assaulted our ears from below and I was slammed into my seat. Two gravities. My display showed the ice below us lit by the flame of our descent. It seemed coming up far too fast, but slowed at the last. Acceleration melted away until we were hovering.

"We have an anomaly. The landing gear will not deploy. Probably due to ice."

"Hover lower," Captain Martinez said, sounding cool and professional as our fuel reserves blasted away. "Maybe we can steam it loose."

"There is some risk."

I could feel the risk. We were rocking and skidding back and forth as the ship tried to stay in the same place balanced on a column of fire, its backwash reflecting off the ice.

"Accepted. Lower."

The rocking, scudding, and buffeting increased. The gear stayed up.

"I'll never be able to climb out the top," Zander said.

I looked up, way up. The top air lock, our only way out if the bottom was blocked, was above the plus-Z level and would be a very difficult climb, up and down.

"Belly view," I said to my display. Maybe we could put the lower hatch over some kind of crater, or depression. . . . I was rewarded by a sheet of ice that looked very flat and unrelieved. Then one of the ship's jerks showed something else.

"Captain, we're carving a trench with our exhaust," I said. "If we can put the hatch over it . . ."

"Got it, Yu. Manual control."

Captain Martinez moved the ship forward slowly, then yawed and cut thrust simultaneously. We thumped hard; lights and power went off as we skidded for a second in total darkness with a screech that sounded like the ship was being torn apart; then that subsided to an occasional rocking motion. Kristine let out something between a gasp and a sob. The slipstream noise that had been with us since entry continued, moaning like a cat in pain. Were we somehow still moving? I had a nightmarish vision of us smoothly sliding across the ice toward some huge chasm; a crevasse, I remembered, was what huge chasms in the icecap were called.

I tried raising my arms. It didn't feel any different than in the centrifuge; strength would not be an issue for me, but endurance remained to be seen.

My screen came back on. The main cabin looked like a huge dark cave, lit by our screens. Still, no one said anything.

The awful slipstream noise continued; we continued to move along at twenty-one meters per second and nobody seemed to be the slightest bit concerned. Was I dreaming this? Had the impact done something to my brain? I shivered.

I rotated my couch to the sitting position manually. The ship was on power-1; photonics only, probably for fear of sparks. Our atmospheric velocity was twenty-three meters per second in the minus-y direction. The numbers varied up and down, but I felt no acceleration: busted sensor, I thought. But then there was the constant slipstream noise in my ears.

"Down." Captain Martinez said. "Is everyone okay?"

"Elephant sits on me," Zander said. "Okay except for that."

"No worries here," Kristine chimed.

I could contain myself no longer. "Doesn't anyone else hear that noise?" I asked. "It sounds like we're still moving through the atmosphere and that's what atmospheric velocity sensors are indicating, though they might be broken. Are we sliding across the ice cap? Is it that smooth?"

Kristine laughed.

"Is wind," Zander said. "Air moves by us. Relativity."

The air was moving by us. It began to sink in now; outside would not be the simple, benign, perfectly insulating vacuum I had grown up with. Outside would mean swimming in a current of freezing gas, ready to suck every last joule from my body.

"Ship, any damage?" Captain Martinez asked.

"There is a probability of some dents in the outer hull," the ship replied. "Several minus-z sensor heads, while still connected, are likely to be out of alignment. The plus-z thruster port doors were sheared off and the thrusters blocked with snow. High-speed atmospheric maneuvers should not be attempted until this is repaired."

I glanced at the fuel state on my board; we had about 2 km/s free-space delta-v left, enough to reach orbit on the Moon—but about 8 km/s too little to reach orbit here. Moreover, we would have to use much of it in our fuel cells to maintain power and warmth. No point in worrying about high speed atmospheric maneuvers—we were going nowhere.

"Our radiators are at minimum and there is still difficulty in maintaining cabin temperature above freezing," the ship reported.

"Keep the head and sleeping compartments above freezing," Captain Martinez said. "We'll have to live with what you can do for the rest, I think."

"I think we can risk cabin lights now, Captain Martinez."

The lights came on, but it was not the familiar cabin. Here and there sparkled white patches; the very moisture in the air had condensed on certain surfaces. My shivering increased, as though my protective clothing were not doing its job. Suddenly, I wanted out of this, very badly.

"We should be within a few hundred meters of the stranded party," the captain said. "But there's no signal. Let us all try standing up. Remember, we are the rescuers."

I swung my legs over and stood up easily enough; it was just like the centrifuge. No, it was a little different: no rotation, no vibration. In the centrifuge there was always a slight sense of motion. Here, it felt very solid. Standing, balancing, I found, took much less energy.

Captain Martinez walked to the center of the cabin, moving as if she were born to it, which, of course, she was. Kristine stood easily as well.

Zander had rotated his couch to face the center of the cabin, and sat, face grim, with both hands on the arm rests. Then, with a mighty groan, he heaved himself vertical and nodded gravely.

"Open the bottom hatch," the captain commanded.

It retracted easily enough, and revealed, a few centimeters below, a sheet of solid, glistening ice. The captain put a foot on it, gingerly, but it was an awkward posture; if the ice gave way, she'd lose her balance.

She motioned to Kristine. "Come here. Hold onto my hand."

Thus freed from fear of falling, she stomped on the ice. Nothing happened. She stomped again, much harder, several times.

There had to be a hollow nearby, I thought. Even if we'd missed the trench, the engines had been still firing when we hit. "Maybe if we run the engines for a few seconds . . ."

"CLR-18, what do you think?" the captain asked.

A few minor clanks ensued. "A cold gas test indicates that some of the array nozzles may be blocked with ice. This may not be a problem: however, caution is warranted."

"*Sí*. We will not risk it. We need to get under the ship and clear a way."

The captain stomped once more on the ice, to no effect, and backed away from the opening.

"Captain?"

"Yes, Ensign Kent?"

"One of us could exit the air lock, rappel down the side of the ship, find the trench, go under the ship and survey the situation from the outside."

"Robot work," Zander said.

"Our robots aren't much good in one gravity with frozen joints," the captain replied. "Are you volunteering, Kent? We should both go, for the buddy system."

Zander tottered over to the hatch and looked down. "Any lights on bottom of ship?" he asked.

Captain Martinez nodded. "Yes?"

"Ice is very clear. If we turn off light inside, and turn on light outside, maybe we see something."

"Do it," the captain said.

The inside lights went off, and as our eyes adapted, an eerie glow came up from the ice below the hatch. We could, as Zander thought, see the glow of our outside lights through the ice.

"Not very blue," Zander said. "Ice thin. Axe in kit."

"I'll get mine," Kristine said and scampered back to her station, moving quickly and easily.

The two Earth-born women, I thought, would easily surpass Zander and me in physical prowess. Or would they? Zander perhaps, but I had done my exercises. Despite what I felt like, I should be, just from male muscle mass, the strongest of the crew. No, I wasn't the athlete that either Kristine or Captain Martinez were, but this might be a situation where sheer weight mattered.

Kristine came back with an ice axe and began chipping away. Soon, a pile of ice chips began to accumulate. I found a plastic bag and a brush in the galley, and brought them over. There was only room for one person in the work area, but, when she took a rest, I moved in and swept up. We developed a rhythm, Kristine chipping away for a minute or so with me sweeping after. Chip, sweep.

"Do you want to have a go with the axe for a while?" she asked me after a kilosecond or so of this.

I nodded and moved into position and picked up the axe. While it was harder to lift in the Earth's gravity, it felt light—easier to move around than something of similar weight would have been on the Moon. I raised it and swung the point at the ice, aiming to widen the hole Kristine had dug. My arm and the axe fell with breathtaking speed, I missed where I was aiming at and the axe tore itself from my grip and landed in the bottom of the hole.

"Keep your head steady and your arm straight," Kristine said when the laughter died down.

I did this and was rewarded with a satisfactory crack and splinter of ice with my next blow. At first, the work was all in lifting the axe, but as I gained confidence in hitting my target, I started to push it down a little as well. I began to work up a sweat, and, for the first time since landing, was not a bit chilly.

"Did you hear that?" the captain asked. "Strike that way again."

I swung the axe again, hard, on the side of the minus-y side of the hole and it hit with a satisfying "thunk." I hit on the other side and the sound was more like a klink.

"Move over," the captain said, and she took the axe. Kneeling on the edge of the hatch on minus-y side, she tapped on the hollow-sounding area. Then she measured her distance, took a swing and got the thunk. She nodded and motioned us to back away a bit. Now she lifted the axe high over her head and with a slight "oof" brought it down with blinding speed. Boom, crack, and we were through. Almost immediately, a bitter cold draft swirled up from the hole.

Be careful what you wish for, I thought, as I shuddered and rezipped my parka.

The captain stuck her head through the hole and looked. Then she stood up and faced us. "There are people dying out in that. Widen the hole so you can crawl through into the trench melted by the rockets, then get your axes and cut a stairway—I do not think the lift will work in this cold. I will try again to locate any survivors."

In another hour, we had something resembling a ramp into the trench. The CLR 18 had surged back and forth against the wind as its belly rockets cut the ice, so the trench was in the direction of the wind. It looked about two meters deep at its deepest point, a little upwind of where we'd hacked through from the hatch. With the ship blocking the top of the trench, it became a venturi tube, and the biting, freezing wind ran through under the ship even faster than above it. The one advantage to this was that it quickly blew away the debris of our chopping. Finally, the moment of truth came.

"Please, ladies first," Kristine said, saving me from a perhaps unwise effort at gallantry.

"Rope," Zander said. "Or you blow away."

Kristine looked at him, nodded, and tied a line around her waist. The hard part was finding a place in the cabin to anchor it. Finally, we tied a knot, stuck it through the wardroom door, and closed the door on it.

Kristine pulled her face mask down, grabbed the edge of the hatch with both hands, then slid into the trench and was promptly carried away, the rope running freely out the hatch.

It would, I thought, probably tear out the wardroom door when Kristine's mass fetched up against its knot at that velocity. I braced myself against the hatch edge, grabbed the hissing line with my gloves and tried to brake it.

My right glove burst into flame and I let out an involuntary yipe, let the line go, and batted out the flame against my belly. But the speed of the line had slowed. Holding on to his couch seat, Zander stomped on the rope; it smoked alarmingly, then went taut. I went back to it and pulled and pulled. In a couple of minutes, Kristine was back with us.

"Don't stand on ceremony," she called to me over the whine of the wind. She was probably smiling, but behind the cold mask, who could tell?

I checked my right glove. One of the layers had burned away, but the rest seemed intact. I could replace it later. I flopped onto my belly and let myself slide down, hand under hand, into the maelstrom. Knowing what to expect, I was able to gain my feet and hold position by leaning into it.

Kristine and I managed to work for about an hour, with me far more tired than she by the end. Zander had to sit most of the time, but could occasionally hand us things like pitons and ropes. We found we could work more easily if we tapped pitons into the ice upwind, and anchored ourselves with ropes against its incessant current.

The steps we tried to cut seemed slippery and unsatisfactory whatever we did. Finally, we resorted a combination of rope and step, and in this way were able to get back into the ship using both hands and feet.

When we got back in, the cabin, now down to about minus 3 Celsius—felt positively balmy. I ached everywhere; after an hour's work I felt more tired than I'd ever felt after a session in the centrifuge. Fluid ran out of my nose freely, ignoring my feeble efforts to snuffle it back in. The outer layer of my parka felt like sandpaper when I wiped it off.

"You know where we are now," Zander said, sitting heavily on his seat and panting from his minor exertions. "On Moon, you wait two minutes in air lock, then walk out and do your work. Here, takes half day to just get out of ship. Still do nothing."

At least my feet had not frozen. I thanked Zander for that.

Captain Martinez had had no luck in detecting a signal from the stranded explorers and now sat before us looking very serious.

"We had a good fix before we landed; they should be within this hundred meter circle." She pointed to a circle on the map displayed in the table screen. "We are here." She indicated a point. "In principle, we need only to march in this direction for half a kilometer and they should be in sight."

Zander groaned. "In this weather, may as well be other side of planet. They dead, likely."

The captain closed her eyes, then opened them. "Likely. But not certain, and, we still need to recover the spy machines. Kent, you and Ensign Yu will make the first trek. It would be better if I could go; I am stronger and more rested, but I have to stay with the ship for security reasons. Despite the way things are out there, we may not be the only people or things about. Are you up to it? People's lives are at stake."

I was dead tired, my muscles in pain all over, and just getting warm again.

"Energy. Stimulants," Zander said. "They can do enough better with fuel to be worth the time to eat. Food is heat."

The captain pursed her lips. "Yes, Kent, Yu, energy bars for both of you. I'm going to save the emergency stimulants for later, but cocoa should be useful."

I jammed three meals worth of bars into myself, and Kristine did as well. The cocoa I washed them down with warmed my insides. If I ignored my muscles, I felt ready to go again.

We added backpacks, belly packs, and hand torches over our parkas. The extra weight bothered me less than I would have thought.

Our target area was upwind and to the right, but we went out the rear of the trench, letting the wind blow us up the slope. Once out of the tube, it was less fierce, and it took no effort to stand upright on the ice. The antarctic night was not totally dark. The stars and my home world, with its crescent at an odd angle to the horizon, cast light enough for our night vision goggles to give us a sense of the icescape, an expanse of little dune-like ridges pale as the Milky Way, separated by deep stygian shadows that could hide anything. The stars looked as bright as I'd ever seen them from the Moon's surface; Eta Carinae was spectacular and the Magellanic clouds were high above me. The southern cross was upside down, but still only halfway to the horizon.

Kristine touched me. "Homesick?"

"Yeah."

"Shouldn't we get to work?"

I nodded. The heads-up display in my goggles indicated our target was toward where half of Orion and Sirius lay above the horizon. We started trudging in that direction, with the radar built into our torches scanning ahead of us, looking for crevasses. Half a kilometer—only five football fields, but it seemed much longer.

We were not too uncomfortable; well protected from the wind, the sound chilled us more than the wind did. Finally, we reached the center of the target area. I scanned 360 degrees all around us, but even with infrared amplification at maximum, I couldn't see anything.

"Look, moving lights."

I looked where the dark shadow that was Kristine's arm pointed. Far away—much too far to be the lost expeditions—tiny feeble glows bobbed and winked in and out.

"Stars on the horizon? Some refraction effect?" I hazarded.

"Not bloody likely."

"Do we risk a flare?"

"They know we here!" Zander's voice said in my helmet. "News that we were coming and CLR-18 was big flare itself. Nothing to lose. But need to find expedition, fast!"

"Ensign Yurovich is right," the captain said. "Use a flare. Besides, it will be useful to know if there is any report of it."

"We have news?"

"Line of sight to the Moon, Yurovich. When President Reynolds announced our rescue effort, just an hour ago, Mr. Barman called her and told her it was appreciated but unnecessary, and that the UN had its own resources nearby that could be sent. The look on his face when she told him we were already on the ice was something to behold. Anyway, if your moving lights represent a public effort, they will acknowledge seeing your flare, I think; if covert, they will maintain their silence. Ensign Kent, the flare."

Kristine took a long skinny object from the side of her belly pack. She broke off a paper tube, which the incessant wind quickly took away, and stuck the spike this uncovered into the ice, slanting it well into the wind. We backed off and the rocket lit off with a poof, jetting up wind. "Look down—you don't want to be blinded," she said.

It was hard not to watch the rocket's progress, but I lowered my eyes to scan around the alien landscape. In a few seconds, it was lit up bright as day. I spun around slowly, as Kristine, ten meters away, did too. Nothing. The flare was quickly blown far down wind.

"Inertial guidance says they have to be there. Could they have dug in deep enough to hide from us?"

Kristine pointed her goggles directly down at the ice and nodded. "They might have done. Let me chance another flare."

Just as the light of the second flare faded off to nothing, I caught a glint. I aimed the radar in its direction, and got a bright metal return in a linear ice feature about fifty meters away. "Over there! A marker of some kind."

By adjusting the radar frequency, I saw that that the bright return sat over the ghost image of a small crevasse or a depression of sorts in the ice. "I think there's a hole or open crevasse below."

It was visible on infrared when we got there, but just barely. Two of their sledges formed the roof of their shelter, now covered with blown snow, and the third was wedged flat in the crack below it. On that narrow sledge, they'd erected a four-person tent.

They'd left a pitoned rope hanging over the edge, which lay across some footholds hacked into the slanted ice wall of the crevasse. Kristine hung on to the rope with one hand while she laboriously dug snow out to get down to them. I tried that when I followed her and found that I had nowhere near the endurance of strength that she had. Indeed, after six hours in a full gravity, four hours more than I'd ever spent in my life before, I became quickly fatigued and had to rest often; though I had no problem with simple strength after I did.

They were unconscious when we reached them, six huddled together in a tent meant for four, hypothermic but not frozen solid—or in rigor mortis, yet. Among them were three roughly spherical objects about the size of soccer balls with four jointed legs folded under them. The tops had been removed and alligator-clip wires ran from them to a small, boxy thermionic heat pump that wasn't putting out anything anymore.

Kristine started digging through her kit immediately while I reported in.

"Captain Martinez, we've found them and they're in bad shape. Vitals on the way in as soon as we can risk exposing them. Kristine is deploying our emergency heaters, but they'll only be good for a few hours. We need power. Is there any way we can get a line here from the ship?"

"We have three kilometers of conducting cable on board, but it is in a top locker. The door actuator motors are frozen. The door is structural, held in with pins when closed; it cannot be opened without moving those pins and the pin motors are frozen, too. Is there anything in your kit you might use?"

I took my packs off and rummaged through the stuff, hoping to see something of use. Some of it seemed clearly useless; an ultralight titanium solar oven concentrator, for instance—great for when the sun rose in a month or so. A square meter or so of photovoltaic cells, too, rolled up in a tube. Smart fiber emergency blankets—the expedition members had already deployed their own.

"I don't want to hurry you," the captain said, "but the approaching infrared sources are maintaining radio silence. They are on vehicles, too. I would guess an ETA of five hours. The people approaching aren't announcing themselves. The UN has announced a relief operation, but it's not due here until tomorrow. When I asked about the approaching sources, they said we might have an instrument problem. It is not an instrument problem."

"The satellites would pick them up."

"The ISA is the only organization doing polar surveillance just now; they control the data. We'll remedy that in a couple of hours. A covert group would not necessarily be concerned with casualties and may not want any witnesses to their existence. They could pass off their early arrival as bureaucratic confusion, maybe. But I am not sure we wish to count on that."

The air in the tent felt noticeably warmer now. One of the expedition members groaned, the first sign of life from any of them.

"I've put sensor patches on all of them now," Kristine said. "Medical telemetry on the way."

I thought about telemetry and communications as I helped Kristine untangle the people. One woman, just coming back to awareness, started shaking uncontrollably. The heaters were helping, but it was still frigid in the tent. We had all the power we could need just 500 meters away.

Communications; the ship had a communications laser, tight beam. I had a flexible photovoltaic panel, and Kristine would have one in her kit as well. "Captain, how much power can you put on us with the communications laser?"

"About ten kilowatts continuous, less absorption by the atmosphere and blowing snow. Do you want us to try to heat you with it?"

"No, we have field photovoltaic arrays in our kits. There's no sun, but maybe you can make one for us."

There was a delay on the other end.

"We can't point the comm laser at you yet; its actuators are frozen, too, but ensign Yurovich is working on it. You should proceed with your plan as if he succeeds, I think."

"Roger that."

I looked around the cluttered tent for something resembling an extension cord. There were about two meters of wire between the robot power supplies and their thermionic heat pump. I disconnected the heat pump, punched a small hole through the tent with my knife and pushed the end of the cord through.

"Kristine, I have to go outside for a few minutes."

"No way. As I have to stay with the people, that would violate the buddy system. Our heaters will hold us for a while."

I pointed at the spy robots. "If we recharge the robots, they'll be able to go back and forth between the ship and here better than we can. These people's lives may depend on it. Ours may depend on those being far away when these mysterious infrared sources get here."

Kristine stared at one of the unconscious explorers, lips pursed, eyes narrowed. I'm terrible at reading expressions accurately, a liability made worse by a vivid imagination. The name tag read: Richardson. "Less than amicable . . ." Kristine had said. I don't know what he'd done to her in their past life together, but I imagined she wouldn't be totally devastated if circumstances allowed saving only five of the six lives in our hands.

"It has to be done soon or we may *all* die," I added.

"Sorry. It's just all a bunch of macho games, isn't it? Covert operations, control, deception—those things all belong to the previous century, but here we are taking these ridiculous risks. Well, scream if you break a leg out there, will you?"

"Right."

As I exited the double flap entrance of the tent, I hesitated. Should I really leave Kristine alone with Richardson? That, I decided, was an uncharitable thought. Besides, I had enough worries of my own. I pushed my way out through the flaps and pulled myself up the ice stairs.

The wind, if anything, had picked up. It found some open crack in my right sleeve and sent a chill up my arm. The sledge roof creaked ominously as I crawled over it on my belly, but held. I had to use my axe to fish the plug end of the cord up from the tent roof below. It took several tries, but with the axe in my right hand, I was finally able to tease the cord up high enough to grab it with my left.

I rested for a minute and started to get cold. Not here, I told myself. Keep moving.

I had to lift my mask and hold the cord in my teeth while I fished the solar cells out of my pack. I then had to take my big overmittens off to unsnap them. The thin material of the gloves underneath may have done well in vacuum, or still air, but the icy wind sucked heat from them. I would have to endure it.

Then I discovered two things, one of which I should have checked before. The arrays didn't want to unroll in the cold wind and the prongs on the plug on the cord didn't match the plug on the arrays. I decided to tackle the second problem first. The cord had a standard Australian plug while the arrays, like everything on the Moon, had a North American standard outlet.

"Zander, will the expedition equipment take 110 volt AC?"

"*Da*, converters will provide proper DC voltage from any AC input up to a kilovolt at any frequency from fifty hertz to a kilohertz. Batteries take longer to charge maybe; less max current with 110. Working on laser."

"Roger that." I looked at the array. The cord emerged from a small box that was probably an inverter—a shame to lose power by going from direct to alternating and then back to direct. The plug was frozen hard and my hands were getting that way fast. I jammed them into my parka pockets and discovered my universal tool; it had needle plier jaws on it. If I'd been inside, I'd probably have tried taking the plug apart. As it was, the clock was ticking.

Brute force time. I applied the pliers to a slanted plug prong, twisting. The plug casing shattered, leaving the bare prongs still, thank providence, attached to their wires. Holding them with the needle end of the pliers, I shoved each prong into one of the North American socket's parallel slots. There was enough friction to hold them there.

Now I had to replace the damaged insulation somehow. Here my studying the content of my kit back on the CLR-18 paid off. There was a package of wipes in my parka's right front pocket. I got them out, wrapped several around the connection, then twisted a last one into a short length of cord, with which I tied everything in place. That would have to do; my fingers were so numb by this time that I couldn't get my mittens back on.

"Damn! Can't get gloves on, fingers

too cold."

"Get hands under parka, down in waistband, in crotch," Zander said.

That, I realized, was an excellent idea. I did this quickly, freezing my groin in the process, but the fingers started to warm. As they did, they hurt like hell. I groaned.

"Fingers hurt, yes? Good. Not lose them. Now shut eyes."

Why that? I wondered. Oh . . .

The world exploded in light, dazzling me before I complied with Zander's direction. I lay there bent over in a near fetal position, hands hurting, blinded with purple spots in front of my eyes and shivering uncontrollably and getting wet.

Wet? I opened my eyes again, gradually. The light of the comm laser was a deep red, I knew, but it was so bright I saw it as white; my yellow parka was a deep orange, however. The snow on top of the sledges was beginning to melt. My ersatz insulation job! The tissue would get soaked and it would short.

My hands felt usable again. Forcing myself to move deliberately, I got my gloves on again and lifted the cord above the melting snow. The array was unrolling now, of its own accord.

"Good show, Zander. What did you do?"

"Microwaves go through boron fiber hull, warm actuators."

"We used the CLR-18's spare radar unit *and* the laser," Captain Martinez added.

I propped the array up on the marker and looped the cord around the top to hold the array to the marker in the wind, and hold the connection out of the wet. "Thanks, it worked."

I had to lean on the bottom to keep it from flapping away, however. Tape. Again, I needed some tape, or the equivalent. My med kit.

I took my hands out of my mittens again; the combination of biting wind and hot light felt weird, but by blocking most of the wind with my body while keeping my hands in the light, I was able to open the med kit and find the tape. I didn't do a pretty job; just looped the tape around the bottom until it ran out. The result flapped and vibrated, but seemed like it would hold for long enough. The telltales told me it was pumping out power. Repacking the med kit took a ridiculous amount of time, but I thought I might need it again. Finally, I got myself back down the crude rope and step arrangement and in through the double flap arrangement.

The stench almost drove me out again. Our emergency heaters, combined with modern insulating fabric, shelter from most of the wind, and the heat of seven human bodies—six unwashed for over a week—had brought the small space up over room temperature and driven from refrigerated hiding every noxious odor known. Clearly, in the last days, some of the expedition members had not been able to use even what primitive toilet facilities they had—which I suspect were overflowing.

Almost reluctantly I pulled off my mittens, hood, face mask, and nodded to Kristine.

"Two hours, Abe. You were out there two bloody hours and you look like death warmed over."

"Sorry. We have power?"

A spark crackled and a wiry, sandy-haired man lifted his head up from the robots he was working on and smiled. "We have power. I'm Sam Reynolds."

I stuck out a defrosted hand. "Abe Yu. I see Kristine has taken care of you."

She shot me a look of pure fury.

"Kristine Kent? Small world, or rather, small universe, I fear," Reynolds said as he shook my hand, firmly enough for someone near death's door only a couple of hours ago. Kristine had apparently not introduced herself, at least not fully.

There was something in the way he said that which spoke of mixed feelings for his rescuer.

Kristine sighed. "You have heard a lot

about me, I suppose. It was not my choice to be here, you know."

"Understood. We've heard a lot about you and the Moon," Reynolds added, a bit wryly. "There's always another side."

Oh, crap, I thought. What they'd heard, they'd heard from her ex, of course. He'd had weeks to unload. "Less than amicable . . ."

"Nothing personal toward the Moon, I'm sure, other than that I live on it."

Reynolds grunted. "Abe, my wife, Sue Reynolds is over in the corner. She'd give you a hug but she's not feeling well just yet."

The woman put her head up. "Oh, I'll be all right in a few minutes."

She didn't look like it—and she put her head back down very quickly.

"I'm working on Richardson now," Kristine said. "He might not make it. We need to start I-Vs on the other three."

I thought about the implications of "He might not make it." Whether or not she had murder in her heart, it could get quite tense if her ex didn't make it while under Kristine's care. Sam Reynolds, eyeing the robots with a smile on his face and wolfing down an energy bar, seemed to get stronger by the moment. I figured I could leave that part of the mission to him for the time being.

"Kristine, I'm lousy at sticking needles into people. Why don't I relieve you with Richardson?"

One look from her and I realized my effort to be diplomatic about the situation had failed completely.

"On the other hand, we all do what we have to, I suppose."

"Right. My kit's over there." She gestured to the pile of bags in the corner of the tent. The yellow box was open on top.

I fished out my emergency medical kit again, thankful that I'd taken the time to repack it properly. Its I-V module was about half the size of a deck of cards, but had what was needed. Kristine's would be identical. Two I-Vs, three patients—I would have to do some kind of triage.

"I can give you a hand," Reynolds said. "I feel strong enough."

Another kind of triage. If we didn't get the spy robots powered up and out of here soon, we'd all likely get killed.

He seemed to understand what I was thinking and shook his head. "There's nothing to be done with these until their batteries charge."

I nodded. "Okay, thanks."

Two men and a woman were still unconscious. They were on their backs, and covered. The readouts from the sensors Kristine had attached showed their body temperatures were still depressed about five degrees Celsius. One of the men had a heartbeat that seemed way too slow, and seemed to have stopped breathing except for irregular gasps almost a minute a part. The woman was breathing more rapidly than the other man, but both seemed stable for the moment. The guy that was gasping would be first.

He didn't respond to the stab of the needle and his blood was as blue as I'd ever seen. His core temp was down to 29.7 C. A microanalyzer built into the needle module sent the data to the ship's computer. It told me to give him D5NS, so I found the dehydrated tablets, put them in the I-V bag and handed the bag to Reynolds, who crushed them, ran sterilized water in through a filter/heater collar, hooked it up to the needle and hung the bag from the roof of the tent with tape.

While he did this, I turned to the woman simply because she was nearest; the condition of the last two was essentially the same as far as I could tell. I bared the arm, wrapped the elastic around it and looked for a vein. She moaned when I slid the needle in. I got almost no blood out of the woman—must have missed the vein. An alarm started beeping—the telltale on the last member. I made an instant decision to finish what I was doing. I had to try somewhere else; the vein was visible enough, so I tried a little ways up the arm from where I tried the first time. This time, the telltale in the smart needle indicated I was in.

I turned the hookup over to Reynolds, then stepped awkwardly over him and the woman to the next person. As there was nowhere to kneel and scarcely a place to put my feet, I bent over the man, Simmons. He'd stopped breathing, though there was still a weak heartbeat. His core temp was right at 30 C; too low.

"Ms. Reynolds, move over," I said, touching her shoulder. She groaned and shifted her body further into the tent wall; the whole tent wobbled and my first I-V pulled free from the roof and landed on its patient.

"Got it," Sam Reynolds said.

I knelt down, got the breathing tube in the man's mouth and started breathing for him.

"You!" a new voice said, weak but still filled with hostility. "Stay away from me, you bloody bitch." Kristine's ex had come around.

"I didn't plan to be here," she said. "For now, just pretend you don't know me. I'm going to give you some glucose. Just relax. It will all be over soon enough."

"Bloody well better be."

"I'm trying to save your life."

"Which wouldn't have been in danger if it weren't for your little spy mission here, would it?"

"I didn't make the bloody crevasse, you idiot!" Kristine had definite tears in her eyes now.

"Abe, do we have another I-V, anywhere?"

I looked up, "No."

I turned my attention back to Simmons and got his breathing going again, then asked, "Sam, do you guys have another I-V kit in here? In your medical supplies?"

He shook his head and pointed down, reminding us that the sledge on which the crowded tent was perched lay jammed in the crevasse where much of their supplies had tumbled. "There was an ice bridge thick enough to defeat the radar, but flimsy enough to give way with the weight of two sledges. Unlucky."

"Yeah," I said. "Unlucky." I looked at Simmons—he was breathing on his own again, but it looked marginal. "Kristine, how's it going?"

I looked over. She wiped her eyes with her sleeve.

"Is yours still breathing, Kristine?"

"Just barely. I think he's fading." Her voice was cold and professional.

Hatred of a formerly loved one, I thought, must lie over love like this icecap, accumulated over eons of coldness hiding what was there before. Sear the covering away, and there it is, again, in its most elemental form.

"Captain Martinez," I said.

"Go ahead," her voice echoed from my helmet speaker and Kristine's.

"We may lose a couple of people. We need more medical supplies here, somehow, quickly. Two I-V's and a defibrillator at least."

There was a silence of several seconds. There was a fair amount of noise in the tent now, but I could still hear the wind over it, stronger than ever. "Then I will bring them. Ensign Yurovich will take command of the CLR-18."

That, I realized, was a momentous decision for her. She might have sent Zander, but he clearly wasn't up to it physically. He could talk to the ship's computer just fine, though.

"You'll be able to see the beacon on radar . . ." I said

"I can follow the laser beam, I think. Martinez out."

I felt like an idiot. There would be a brilliant highway of scattered light leading right to us.

She arrived in fifteen minutes, towing a pallet that turned out to contain everything she could think of; additional rations as well as medical supplies. And she was in time. An hour after she arrived, our patients were apparently out of danger and Sue Reynolds had recovered enough strength to assist in caring for the others.

I had just started to think we'd get out of this unscathed when Zander called.

"Code C, Captain Martinez."

Captain Martinez held up her hand. "Radio silence. Our visitors are almost here." She turned to Sam Reynolds "How are the robots?"

"One percent. Actually, that's fairly good; they were designed for thirty days. They could go ten kilometers on what they've absorbed so far."

"Not far enough, is it?" Kristine said.

Captain Martinez looked at her for a moment then shook her head. "Easy, Kristine. Throwing them down the crevasse is not good enough; they have too much metal and would be too easy to find in the ice, I think, though it might delay their recovery. We will send them to the ship; that's CLR property. They shouldn't search it."

I had a bad feeling about that. "Officially they aren't even there. That gives them freedom of action and gives the ISA deniability."

Captain Martinez closed her eyes. "I was once very close to someone in the ISA. They are not all bandidos; many think they are doing what is right for all humanity."

"Do we bet our lives that's right for this particular group?" Sue Reynolds asked.

Captain Martinez didn't answer immediately. In the silence that followed one of the emergency heaters gave out with a sputter and the wind noise and flapping tent fabric made it very clear to us that clocks were still ticking.

"No. But to send the robots to the ship . . . it is our best hope, I think. But it must be now, *pronto*!"

Sam immediately started disconnecting leads. I grabbed a tool and began reattaching the housings.

"Code B," Zander called out from the ship.

We didn't need to be told what that meant. I started putting in every other screw.

"Richardson's gone," Kristine said, tonelessly. "Heart stopped."

"Defibrillator?" I asked. How could that have happened? He'd been talking just a minute ago, not sensibly to be sure, but talking.

"In here? How could we clear? He's gone now, anyway." Kristine sobbed.

We were all silent for several seconds. Deep down she must have still cared, I thought. There must have been a happy time for them once with dreams of a lifetime together.

"What about everyone else?" Captain Martinez asked.

"Conscious or resting with stable signs." I said.

"We're all right," Sam Reynolds said. "Sue and I can take care of things. Do what you have to do."

Captain Martinez stood up; she was probably the only one who could do so in the cramped tent. "*Sí*. Yu, come with me." She hesitated a moment. "Ensign Kent, deal with it later. We need you, too, now. Suit up and join us as soon as you can."

She stared at the captain for a moment, then wordlessly started getting her gear together.

We lugged the robots out and sent them on their way, the steel tips on their spidery legs making short work of the rudimentary ice steps that I'd had to negotiate so carefully. I was about to go in when Captain Martinez pointed at the solar array and the laser illuminating it.

"Remember how difficult this was for you to find? I think it should be even more difficult for them. Do not ask any questions, as I want the listeners to believe the lies I will tell." She put a gloved hand in front of her mouth and looked at us. We nodded.

"I will now break radio silence. Ensign Yurovich, we have recharged the batteries on one of the motorized toboggans, but would like a little more power, so keep the laser on us as we move south to prepare location A."

Captain Martinez pulled the tape away from the array, unplugged it, and began walking south with it over her head. "Keep the laser on us, Ensign."

After an initial hesitation, the comm laser beam started following her. I quickly zipped up my parka and pulled down my face protection as the warmth of the beam left me. Then I grabbed the marker tripod and disassembled it. We had the location in our inertial guidance units. No one else needed to find us just yet.

About fifty meters beyond the crevasse, Captain Martinez rolled up the array and stopped, but told Zander to ". . . keep the beam on the array as we go south."

He catches on quickly, I thought. With barely a hiccup, the bright sunny spot on the snow kept heading south at the speed of Captain Martinez' walk. It would be so bright in the infrared, I realized that observers would have a hard time distinguishing any objects in the beam—or whether there were any in it at all.

Captain Martinez walked back toward my position, a dark shadow silhouetted by the retreating laser beam spot. When she arrived, she took a cylindrical object from her pocket and, holding it like a telescope, carefully sighted some object in the sky through it. A pulse of violet light stabbed upward, so short I could almost see it as a pulse instead of a beam. A narrow-beam data burst to a relay satellite, I surmised.

Almost simultaneously Zander said, "Code A."

"Down," Captain Martinez whispered.

We scrambled down, but instead of going inside, Captain Martinez took her ice axe and began chipping a ledge in the ice. "We need to keep a lookout."

She stepped up onto the ledge she had just cut.

I followed, having to crouch a little to keep my helmet just high enough over the edge of the crevasse to see. She'd cut the ledge for her own height. What I could see of the ship was the area on top just beneath the bright origin of the comm beam, and a slight glow from below from the open hatch, I presumed. The rest merged into the blackness of the polar night.

"I have cargo. Am securing." The hatch glow faded into night.

"He seems to be moving around all right now," I whispered to the captain.

Captain Martinez nodded. "He will be disassembling the spy robots, hiding their components in various places."

"Can he get all that done?" I worried—Zander could barely move.

"Look at ship's telemetry, channel A."

The ship's atmosphere read 1.1 bars, O_2 80%. "Captain," I said, "He's flooded the hull with oxygen, to stimulate himself. That's dangerous."

She nodded gravely but said nothing.

"Does he have time?"

The captain shook her head. "Listen."

The whine of turbines had become noticeable above the constant gale. I flipped my visor up and scanned in the direction of the noise with my infrared binoculars, but saw nothing.

"They are near the ship," Captain Martinez said. "The wind disguises the direction of the sound."

Of course. I turned to the ship and scanned the edge of the pool of light thrown by the comm laser. I caught the slightest hint of motion and saw a gray shadow emerge from the cold black. It looked a bit like a tortoise on tank treads. It was followed by another and then another; they were huge, half as large as the CLR-18 itself.

I flipped my goggles down and noted the inside pressure was down to 0.85 bar, ambient for this altitude. Perhaps Zander had finished his chore, or come to his senses about the danger.

Black shadows detached themselves from the newly arrived vehicles and headed into the trench that lay under the ventral port. I knew better than to suggest that we try to do anything; we were virtually weaponless and only three of us were in shape for any physical activity.

The telemetry from the ship vanished; I looked at the captain.

"Interference; they're killing the carrier wave." She took out her hand-held device again, sighted through it, turned away to another location in the sky, and spoke rapidly, though I couldn't hear what she said over the wind.

One of the ice vehicles started moving, heading south toward where the patch of light from the com laser was now focused.

"It won't work," I said. "When they find we aren't there, they'll interrogate Zander."

"Maybe he will tell them we must have left the beam somewhere along the route. He would not know then."

"They'll get it out of the ship's memory."

"No, that would be much too hard. The ship would wipe it first. Ensign Yurovich is a clever person."

I was looking at Captain Martinez when she gasped. At first I thought she'd been hit with a bullet but then her facemask was lit up with a strange bluish light. I turned around. The CLR-18 had split open and was gushing flame.

"Zander . . ."

Captain Martinez pulled me down. "The propellants, they are hypergolic. When the flame reaches the tanks it may . . ."

The boom arrived right on cue. Then the wind halted eerily and a white snow started falling on us that was somehow different. I took a mitten and glove off to feel it; it didn't melt, but crumbled into a fine white powder. "Titanium oxide," I guessed out loud. Much of the ship's exterior had been made of titanium.

The whine of turbines announced that our visitors were on the move again. We waited for five minutes and poked our heads up. The upper half of the ship was gone and what was left looked like the rib cage of some alien monster skeleton bathed in red light from numerous fires still in progress. A scan with the binoculars was futile; the visitors had vanished into the gloom, or got caught in the explosion. I hoped for the latter; if only Zander had been able to take them with him!

"I know it doesn't look good," I said. "But we have to see if . . . if there's anything left."

"They may be waiting for us to show ourselves," the captain said.

We said nothing for what might have been a minute.

"We must risk it, anyway," She said at last. "Wait here, I will tell what has happened and what we will do."

Kristine came out. "Oh my god," she said when she saw the wreck. "He's not likely to have survived that, is he?"

"No, it is not likely. But even if it is the worst, the flight recorder should have survived. We will see what they did and then we will see that everyone knows."

"If we make it out of here alive," I replied.

"Even if not," the captain replied, the ice in her voice somehow on fire.

We stepped out of the crevasse and pressed toward the embers. Though the wind had resumed it seemed less menacing now, a minor problem compared to the disaster that had occurred. Zander had brought it on himself, I told myself. Not exercising so he needed the extra oxygen. Now he was dead and we were not much better off; without the resources of the ship, we would soon be in the same state as the people we came to rescue. None of us spoke a word of that, however. Whatever he had done, we would have to find what remained of our comrade.

When we got there, the remains of the ship's hull jutted up over us like some ribs of a turtle skeleton on its back, burnt away from the belly down.

We walked in through a crack in the shell to where we'd been meeting and donning our antarctic survival gear just a couple of hours ago. The equipment was gone to cinders and there were just longerons covered with white titanium oxide ash to show where our stations had been.

The least damaged area was at the bottom near the door. Near that were three blackened human skeletons, any of which might have been Zander. The wind whistling through the wreckage seemed to call my name with his voice. "Yu, Yu . . ." I shivered.

What remained of a titanium rib fell with a snap and landed with a boom, just missing us. I had never believed in ghosts, but then, for a moment, I felt doubt.

"We should go down into the trench," the captain shouted. "The data recorder is behind a panel near the hatch. It is sheltered now under there; the wind has changed direction. We can talk there."

Wordlessly, we walked out of the burned out shell the way we came. The trench was littered with debris of all kinds—some intact, some little more than ash, and everything between, all trapped in ice melted from the fire. But when we got underneath the wreck, what amazed me was that the underside or the ship appeared untouched and the ice unmelted.

Kristine tapped the refractory foam that covered the bottom of what had been the CLR-18. "The atmospheric insulation works in both directions, apparently."

"I am at a loss," Captain Martinez said as she recovered the flight data record. "I suspect they were about to discover the spy robots and he managed to destroy all the evidence to save us, at the cost of his own life. You do not know what blesses you until it is gone."

"Poor Yurovich. He knew the chance he was taking by using hyperbaric oxygen," Kristine added. "He put the mission ahead of himself after all, then. We shall all miss him."

I nodded, but felt uneasy. Self sacrifice and taking chances had not been in the character of the Zander I knew. He had been smart as a whip and always looked for ways around difficulties. Then I remembered the change in the pressure reading in the ship—from overpressure to ambient. I also remembered the big engine bay door lying in the trench, covered with the same insulation Kristine had just tapped.

"No, no, he would find some way out of that," I said, looking around wildly. "Maybe he had left the ship before the explosion."

"Ensign Yu . . ." the captain started, then stopped.

I heard that faint voice calling through the wind again, but this time it sounded even more like the wind. "Yu, Yu. Help me."

"Do you hear that to? Do you hear that? I yelled at the top of my voice. "Zander! It's us. They've gone away. You can come out now!"

"Here. Panel is too heavy." His voice was faint, but we all heard it as the wind relented for a moment. A landing gear door panel, probably scraped off in our crash landing!

"Zander, it's probably frozen in. Don't waste your strength. Keep talking, we'll find you. Sing something."

"*Ochi chier-nie . . .*"

Kristine giggled, on the edge of hysterical relief. "He likes you, captain dark eyes."

"*¿Qué?*"

More giggles from Kristine; "Keep singing! I want to hear Moscow Nights next."

Zander kept singing and as we moved toward the south end of the trench, his voice became clearer. I searched for the engine bay door, found it among debris of all kinds and started walking toward it, but since I still didn't trust myself to run in a full Earth gravity, Captain Martinez and Kristine beat me to it. They pulled on the panel and the ice cracked with a bang, releasing it. They turned the panel over. There, resting on a bed of aerogel, was Zander.

With a groan, he sat up. "Concert over. I hid because not sure how they would question me. I thought ship would defend itself."

"They tried to burn their way into something with a cutting torch, I think. They did not know about the oxygen."

"*Da*, I am sorry."

"You did what you could. Can you walk? Camp is about half a kilometer away."

Zander was quiet for a while, then held out his arms. "I walk or die."

We took turns helping him up the incline at the end of the trench and, through the dark and the blowing snow, struggled toward camp, trusting the captain's inertial compass for the direction; our eyes were useless. Despite our gear an unceasing headwind began to rob us of body heat. 162 Kelvins outside—I thought of Zander's feet in ordinary space boots self-insulated by a layer of aerogel. My feet moved freely in warm air, thanks to his knowledge of arctic survival. But his might be frozen to blocks of ice. Stoically, he said nothing and continued to step, step, and step.

When I heard the sound of the turbines of the unidentified snow vehicles return, I was almost relieved. It would all be over soon, one way or another, and I wasn't sure I cared how.

"Drop to the ice," Captain Martinez ordered.

We complied without protest. It was good to lie down, despite the cold. I felt infinitely tired.

"Ensign Yu, stay alert," she said.

I looked over at her and she was on her back, pointing her communications device at the stars again, almost directly overhead.

"They find us soon," Zander said. "Despite our coldness, our bodies shine too hot in infrared."

"Just hang on for a little while," the captain said. There was tension in her voice, but, strangely, I thought, hope.

They were upwind of us, and it was surprising how quickly the blowing snow piled up against our bodies. Maybe, they would not find us.

"*Lunar spies, stay down, spread your arms and legs!*"

Whatever boom box they were using put out enough power to hurt my ears. The wind was no match for it. It had its emotional effect as well. Resistance against something that loud simply felt futile. There was something I needed to know, before. This would be my last chance. "Kristine, I am sorry if I seem not relevant, but the split between you and your former husband. Was there a political aspect to it?"

"That matters? No, not really. After we got past the romance, I just didn't want to be so, so dominated, so bloody owned. He wasn't going to change, so I had to make a decision. It wasn't his fault, I'm the one that changed, and he was very hurt, angry. I broke his arm the last time he tried to have his way with me. He got our little boy."

"What? You have no child on the records."

"I put as much distance between us as I could. When I emigrated to the CLR, and the independence movement came, he started making anti-lunar noises. Custody was a weapon against me. But Ricky was difficult in school, a bother. Then Ricky died in an accident boating with his father on Loch Lomond the next year. So that resolved itself, didn't it?"

"You must think he . . ."

"He could have," Captain Martinez broke in. "We think he sabotaged the expedition; he was going to have the ISA base rescue them. But I think they had no intention of doing so."

"The bloody . . . I've no need to apologize then, do I?"

She had killed him. Killed him and mourned him. Love or hate? I thought.

Love and hate.

"Martinez, we want the flight record of your ship. Stand up slowly with it in your hand."

The ice six inches from my right mitten exploded into a shower of chips just as the crack of the projectile thrower reached us. 106 decibels apparently weren't enough to make them secure in their power over us.

Slowly, Captain Martinez got up, leaving the tubular comm unit in the snow under her. It was about three feet from me.

"Have courage, my friends," she said. "*Vayan con Dios.*" She looked first at me, then briefly down at the comm unit. Then she started walking toward her fate.

They weren't, I thought, likely to leave witnesses to this. There was something I needed to say, and had not had the courage to say it so far, but . . . " Kristine, this is a lousy time, but I don't want to die without saying this. I . . . I've had . . . I think you're someone I'd like to be with. I wish we had time."

"Abraham, you're right. It's a bloody lousy time."

She let me feel like the idiot I was for several seconds, then added, "But thanks for the thought, I know it was well meant and sincere. For whatever it is worth, fate has now linked our names together for eternity, hasn't it? I wish you well, but as a friend."

"I had to say something."

"Of course you did. Centuries ago, when the dikes of Holland burst and saltwater flooded the polders, the trees, dying from the salt water at their roots, blossomed and sent their pollen into the wind. Life never gives up, does it?"

"*Nyet*," Zander added. "It does not. There are only three of them in each vehicle. All three from nearest vehicle are with captain. Kristine, if Abraham and I distract them, draw their lights, can you run in darkness to steal it?"

A second spotlight from the second vehicle stabbed on us, centered directly on Kristine.

"They are hearing every bloody word we say, aren't they?"

"*Da*. A bug." Zander turned his head to Kristine with a grunt. "A tiny one, like flea. Maybe it jumps from your ex-husband to you."

Kristine shuddered. "From out of death's heart . . . Well, he won't be shedding any more bugs, will he?" She sighed. "I think this whole scene is getting a bit boring. I'll be some time, as the man said."

She got up, gracefully as always, and started trotting away from the empty vehicle, a spotlight full on her.

"Kristine!" I yelled.

"Ensign, get dow—" The captain's voice cut off with a sudden crack.

There were three sharp reports, and Kristine went down. Ice exploded next to Zander and me. "Kristine . . ." I sobbed softly.

"I obey orders," Zander said. "I stay down." Then he started crawling like a seal away from me. The spotlight on us followed him as ice exploded all around him as he inched and flopped along in random directions to nowhere in particular. I heard men laughing.

But I was left in the dark. I could think of only one thing to try—the captain's communicator. She suspected a bug, I realized, and had said nothing to us that it could relay. But she'd been talking to someone up there. Somewhere overhead. I looked up and saw a streak—even in the urgency of the moment, I realized that it must be a meteor and wondered. Then I took a deep breath, lunged for the communicator and grabbed it. When I did, I saw the ship's record disk under it; Captain Martinez had been playing for time—with her life. Hurry, I thought. I rolled to my back and looked up through the communication device and scanned around overhead. Suddenly, I saw a bright icon displayed among the stars. But I couldn't find a transmission button, or anything with my gloves. It might be voice activated I thought.

The spotlight came back to me—I could have thrown the communicator down, but I'm stubborn. Expecting a bullet at any moment, I started talking.

"Whoever's up there, Captain Martinez has been captured, Ensign Kent and maybe Ensign Yurovich have been shot, and I'm next. If you can, help, please help. If not, tell people what happened. I'm . . ."

The device exploded in my glove, its shrapnel digging pits out of my visor. I rolled over as fast as I could. I got hit hard in my backpack, like a kick.

A brilliant flickering light, much bluer than the spotlight, washed over the snow around me. A distant crackling sound reached my ears. I rolled over again and discovered my legs were still working. Far overhead, a rocket seemed to be descending right on top of us.

The spotlight winked out. I heard a loud clank, whir, a bang and a roar; a missile leaped from one of the vehicles toward the sky, and then another.

The were met by thin violet beams that hurt my eyes despite their dimness and the visor. The missiles exploded almost instantly. Then one of the beams lanced down and touched the ice in front of the nearest vehicle, creating an instant cloud of steam. When it dissipated, the vehicles were heading away at what was likely their best speed.

I struggled to my feet; Kristine lay on the ice about twenty meters away, the captain about fifty. In a triage decision that hurt as much as any I've ever made, I went for the captain; I'd seen what happened to Kristine.

I found I could run in one gravity; the pounding on my knees was incredible, but I did not collapse. When I got there, the captain was unconscious, but breathing. Her visor was shattered and there was an ugly bruise on her forehead, but she was breathing. They seemed to have just missed her. Okay, I could run for Kristine

The roar of the descending spacecraft, a black angular shape with about the same cross section as the CLR-18, but longer and much meaner-looking, drowned out the wind with its belly rockets. Its gear snapped down without any problems. I stumbled and turned my attention back to what I was doing. My back hurt like hell, burning and freezing at the same time. I tried to ignore it, but I slowed despite myself, trying to run in Earth gravity with a full set of arctic gear on against a twenty meter per second wind on little food and without any sleep for about forty hours.

My shadow doubled in front of me. I blinked and it stayed double. I looked up. Another rocket was descending. What was this, I wondered, a lunar invasion of Earth?

Kristine was just ahead of me, and in the glare of the descending rockets, I could see blood on the snow.

I collapsed beside her on my knees and gasped for air, hardly able to think.

"Abe . . ."

She was conscious

"Take it easy. Where?"

"Severed spine," she gasped "A leg wound, too, I think, but I can't feel that, can I? Silly how little it hurts for so much damage."

"They can fix that."

"If I don't bloody bleed to death first. The leg, Abe. Stop the bleeding."

"Yeah." I got my pack off and found my med kit had been blown to bits. I worked hers off as gently as I could, fearful of the damage I might do, found the kit and got my gloves off. The frigid wind froze my hands almost instantly; I tried to shelter them and ignore it as I cut away the layers of cloth where the hole and the blood were, just above her knee. It was a mess; she'd probably lose the leg. Stop the bleeding, somehow. I jammed gauze in the hole and wrapped tape around to hold it tight, making a bloody, sticky mess. But it held. Now for the wound in the back.

"Abe, about us. Yours doesn't sound like such a bad idea right now. Sorry."

I squeezed her mitten, a totally inadequate gesture, but all that time and prudence permitted. She returned the squeeze briefly and closed her eyes.

"Kristine . . . I've got to turn you over now," I said.

There was no answer.

Biting my lip, I eased her over.

The wound in her back was a crater. White bone shone through the shredded parka, backpack, and meat frozen as if in a supermarket. I thought part of her spine was gone.

Four black-clad people surrounded us. Stretchers, tarps, and plastic boxes appeared as if by magic.

"Ensign Yu, we've got her now." It was a woman, short, with a wisp of blond hair showing behind her visor. "Just take it easy, very easy, lean forward into my arms and don't move any more than you have to."

I wondered what the hell my back looked like. I kind of keeled over more than leaned, but she caught me and picked me up as effortlessly as if I'd been a child and spread me out on a stretcher.

Then I fainted.

The roar of rockets and acceleration awakened me. Someone's hand took my hand as soon as my eyes opened. A firm, strong hand.

"We don't have enough fuel to make orbit; we're just hopping to the British station on the coast."

I think I nodded. Things got very fuzzy after that; I fell into a deep sleep. I dreamed Kristine had slipped into my bunk, lay on top of me and began to make love to me, but Zander interrupted us to ask why we were going to Antarctica, so Kristine pushed herself up to answer him and broke in half, making a huge mess of blood and bone chips and intestinal matter, which began to float around the small cubical getting on everything.

I opened my eyes and started to scream; but I was in a clean bunk room, wrapped in sheets and strapped down, in free fall. Then acceleration hit and I passed out again.

The official story is that the CLR-20 rescued us as well as the explorers. The media never mentioned the other long black ship, which is just as well because the UN would have had a righteous fit about a nuclear-powered CLR ship operating in the Earth's atmosphere.

So I must have come up with all that in a delirium. When I met CLR Colonel Sally Duluth officially, at Shepard City on the celebration of the fourth anniversary of the founding of CLR Service, she seemed to be meeting me for the first time—but there was a twinkle in her eye to match the one in the dark eyes of Captain Martinez.

Zander met us there; he lives in Shepard City now, teaching history and playing golf. He is just as big, but, I think, noticeably firmer, and noticeably quieter.

After the speeches and the ceremonies, Zander and I went out alone into the vacuum. Earth hung high in the sky with Antarctica tilted toward us. It was clear down there today, and I was able to find the Antarctic Peninsula and from that, the mountains. West of there, the bodies of Kristine Kent and her former husband lie in a crevasse, far too deep for anyone but those of us who were there to know that they did not die accidentally. Kristine deserved better; she deserves a place in a hall of heroes of the Republic, someday. But the lie preserves the peace, for now.

Zander placed his bearlike hand on my shoulder. There was no need for words. ■

The reward of a thing well done is to have done it.

—Ralph Waldo Emerson

SCIENCE FACT

From Salt Foam to Artificial Oysters:

Innovative Solutions to Global Warming

Richard A. Lovett

On an April weekend in 2001, several hundred hardy souls gathered in a Portland, Oregon park for the inauguration of an Earth Day-style event billed as the Race to Stop Global Warming. Nobody really believed that running five miles of woodland trails would improve the world's climate—even if all of the participants were indeed conservation-minded enough to arrive by public transportation as the organizers requested. But it was a good excuse to get outdoors, make a political statement, and draw attention to struggling environmental groups.

Ironically, the run occurred on a day when global warming was emphatically not in evidence. The runners were lashed by 45° wind-driven rains that left everyone more worried about short-term concerns such as hypothermia, rather than long-term problems such as global climate change. "We could use a bit of global warming right about now," at least one shivering runner was heard to quip.

Jokes aside, global warming appears to be fact—however vigorously some people try to argue otherwise. As I write this article, headlines announce that thinning arctic ice may mean that polar bears, now numbering in the tens of thousands, could be an endangered species by the end of this century. Some parts of Alaska and northern Eurasia have warmed by 11°F over the course of the last century. Satellite photos have shown that the amount of land covered by winter snow has decreased by 2 to 3% per decade, and mountain glaciers are so much on the retreat that our grandchildren may need history lessons to understand why a U.S. national park is called "Glacier."[1]

More problematic is the degree to which these changes are due to human activity. To some extent, natural processes are clearly at work. Strong geological evidence indicates that the Earth has warmed enough to produce a 400-foot rise in sea level since the peak of the last ice age, about 20,000 years ago.[2] Nobody thinks that's due to cavemen filling the air with smoke from cooking fires. The Earth has been rebounding from the "global cooling" that produced that ice age, and presumably the rebound is *continuing*.

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[1] Much of this information, and other information in this article, came from the Fall 2001 meeting of the American Geophysical Union (AGU), Dec. 10-14 in San Francisco, CA.

Modern humans have added a new factor, though, by dumping large amounts of carbon dioxide gas into the atmosphere. Some of this comes from the burning of fossil fuels; some comes from the demolition of forests and the eventual conversion into carbon dioxide of the carbon stored in their vegetation.[3]

Carbon dioxide, as most *Analog* readers know, is a "greenhouse gas," which according to the greenhouse theory of global warming, traps solar heat by allowing sunlight to penetrate the atmosphere, but preventing infrared light from radiating back into space.[4]

Global warming is an empirical observation. The greenhouse effect is merely a theory that attempts to explain how humans may be contributing to this warming. It is, however, a theory that is accepted by a great many scientists.

Marty Hoffert of New York University has divided the global warming debate into three linked questions: (1) Is the warming real? (2) If so, what are the impacts on humans and the natural world? And (3) what, if anything, can we do about it?

The answer to the first question appears to be an emphatic "yes," although I'm sure this article will draw letters of protest from those who disagree. The answer to the second question varies from climate model to climate model. Most probably, if the Earth warms up, there will be winners and losers, both among ecosystems and nations. But it appears that more people will be inconvenienced (or worse) by climate change than will benefit from it.

The third question is the tough one, because solutions could be expensive and disruptive—and even then, there's no guarantee they'll work.

One approach is via large-scale "geoengineering." Rather than fighting the causes of global warming (greenhouse gases, natural climate change, etc.), humans could directly counteract it by taking actions designed to reduce the amount of sunlight reaching the Earth's surface. In fact, climate researchers estimate that all that would be needed to counteract a doubling of the Earth's preindustrial carbon dioxide level (something that is likely to happen in the second half of this century) is a 1.8% cut-back in sunlight. One proposal is to orbit a fleet of large panels, like spacegoing window shades, designed to intercept sunlight that would normally reach Earth. The same could be done by releasing a large number of mirror-bright balloons into the stratosphere or by injecting the upper atmosphere with aerosols designed to scatter light back into space.

Another proposal, championed by John Latham of the National Center for Atmospheric Research, would use salt spray from the oceans to increase the Earth's cloud cover. Latham notes that windblown spray currently creates 10^{28} tiny water droplets, worldwide, per year. These salty particles, typically less than 1/25,000 of an inch in diameter, drift high into the atmosphere where they serve as condensation nuclei for the larger water droplets that form clouds. If there were more of these tiny droplets, Latham suggests, there would be more clouds (and longer-lasting ones) reducing the amount of sunlight reaching the Earth's surface. He calculates that a 15% increase in cloud cover would be enough to do the job, and that this could be accomplished by spraying two pounds of seawater per hour into the air above each square mile of ocean—presuming, of course, that all of the droplets were of ideal size. Technically, this isn't a difficult task. It could be done with a large number of atomizers: carefully machined versions of the spray bulbs or pumps used for perfumes and other consumer products. If the drops were given small charges of static electricity (also easy to do), the Earth's magnetic field would aid in their dispersal.

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[2] About half of that change is due to melting ice. The other half is from the expansion of ocean waters as they warm.

[3] That release can come from burning the wood for fuel or from decomposition of the slash; both processes change carbon-containing biomass into carbon dioxide.

[4] Carbon dioxide isn't the only greenhouse gas, but this article will focus on it because it is by far the most controversial and economically important.

Because nothing is being placed into the air but seawater (which already finds its way there naturally), the direct ecological impact should be low. And, once trials have proven that the process actually works, it could be controlled by weather satellites that monitor the Earth's cloud cover and keep it within the desired bounds. With practice, finer climate control might be possible by selectively turning cloud formation on or off in any given region.

The biggest technological problem would be distributing enough atomizing devices across the ocean. Latham anticipates that a plethora would be needed, perhaps one for every 10 square miles—in total, millions of carefully spaced devices. Ideally, they would have to be anchored—but that would require some very long tethers. Perhaps, though, the process would still work if the atomizers were more tightly clumped in well-chosen locations in shallow water. Or perhaps some of the devices could drift with currents or be installed on ships, to be turned on and off by a global tracking system that keeps tabs of their locations and uses only those that are in the right places.

The downside to all of these ideas is that they might create unwanted changes in weather, climate, or ocean currents—perhaps worse changes than the global warming they are designed to stave off. Also, these approaches reduce the amount of energy available for photosynthesis. That, too, could have unwanted ecological consequences.

Donald Wuebbles of the Department of Atmospheric Sciences at the University of Illinois has made some "very preliminary" attempts to address this issue by modeling the effect of a 1.8% reduction in sunlight. Surprisingly, there was less impact on "net primary production" (total photosynthesis) than expected, with the strongest declines coming in tropical rainforests and the woodlands of northern Canada, Europe, and Asia. In the U.S. and similar climates, the model actually predicted a slight increase in net primary production—apparently because the reduction in sunlight was accompanied by reduced evaporation, to the benefit of plants in areas with dry summers.

Overall, though, Wuebbles urges caution regarding massive geoengineering projects, pointing out that his model is still too simple, and that it may understate the impacts. For example, he says that he has yet to factor in the effect on the oceans, where sunlight would not penetrate as deeply as it does today. Nor has he examined the effect of reduced sunlight on plants living in dim forest understories, where even a small reduction in light might spell extinction.[5]

Going to the Source

By anyone's standard, even low-tech geoengineering projects such as Latham's spray atomizers are radical ways of attempting to offset global warming. And they can be compared to pumping up a bicycle tire every morning because it has a slow leak. That's one way to continue riding the bicycle (I've certainly done such things myself on plenty of occasions), but if you plan on riding using it every day, it might be easier and less painful in the long run simply to fix the leak.

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[5] All told, anti-warming geoengineering projects represent an arena in which one generation's solution could easily become the next generation's problem. If that's not a ripe arena for science fiction stories, I don't know what is!

In the case of global warming, fixing the leak means doing something about the buildup of greenhouse gases in the air, particularly carbon dioxide. In the popular mind, this has been likened to the reduction of carbon dioxide emissions, principally by reducing the use of fossil fuels.[6] There are solid reasons for such a focus. Hoffert notes that 85% of the world's energy comes from fossil fuel (even when allowance is made for minor energy sources such as wood-burning stoves). We use so much energy that worldwide consumption is measured in units called terawatts, each of which is a million megawatts. Currently, the total is about 13 terawatts. Under a business-as-usual scenario, Hoffert says that this will rise to 45 terawatts by the year 2100, even with allowances for mild improvements in energy efficiency. The same scenario predicts that about 20 of these terawatts will come from non-fossil fuel sources. That's a huge increase from today's alternative-energy usage, but it still leaves the world burning twice as much fossil fuel in 2100 as in 2000.

The conventional greenhouse-gas debate gives humanity two basic choices, neither of them pleasant. One option is to abandon the fight, move to higher ground as the ice caps melt, and shift farms and cities to climates that will become more habitable. The other is to cut back drastically on fossil fuel consumption, either by draconian conservation measures or by building a couple of extra terawatts of alternative energy sources every decade throughout the upcoming century.[7] To put that in perspective, building two terawatts of generating capacity per decade is equivalent to putting 550 megawatts on line every day. That's a lot of windmills and solar panels.[8]

Radical conservation efforts are also

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[6] Most likely, it's this focus that has produced much of the backlash against the greenhouse theory. Such a reduction would be accompanied by lifestyle choices that most Americans would find unpalatable.

[7] Not all conservation measures, of course, are "draconian." Many can pay for themselves in saved energy costs. With luck, some other types of abatement efforts might be equally economical. George Seielstad of the University of North Dakota, for example, points out that it's possible for one industry, farming, to save money and increase productivity while cutting back on emissions of another greenhouse gas, nitrous oxide. Nitrous oxide is produced by the chemical breakdown of nitrogen-containing fertilizers. Thus, the simplest way to reduce emissions is to avoid the overuse of such fertilizers—something that can be done by using satellite telemetry to monitor exactly what locations in a field need to be fertilized. (For more about such technologies, see Richard A. Lovett, "The View from Space: Satellites Predict a Lot More than Weather," *Analog*. February 2001, pp. 48-59.) Seielstad has tested this with sugar beets, which produce too many leaves and not enough sugar if they are over-fertilized. In a trial run, he was able to save one farmer more than $1,000 in fertilizer costs on a 151-acre field, while also improving the crop's market value. And, the farmer's nitrogen usage, and presumable his nitrous oxide emissions, were reduced by 40%.

[8] For this reason, mainstream news reporters are being seriously lobbied about the benefits of lunar power stations with microwave relays to Earth. It's not a new idea to *Analog* readers, but it was surprising to see it featured at a press conference at the Dec. 2001 AGU meeting. Other scientists are advocating a return to nuclear power, but in the absence of cheap, clean fusion, this appears politically unlikely. Most people would probably rather swelter than live downwind of a fission reactor.

unfair to people in developing countries. Gillian M. Bond, a researcher at the New Mexico Institute of Mining and Technology, notes that the industrialized world achieved its wealth via the copious use of fossil fuels. To tell developing countries that they can't do the same is extremely unfair, she says.

Like many such debates, however, the global warming debate has been oversimplified. Just as human activities can put carbon dioxide into the atmosphere, there are also ways that we can take carbon dioxide *out* of the atmosphere. These techniques may allow us to continue to use fossil fuels without contributing to global warming, or at least to mitigate the effects of fossil fuel usage while the world's economy makes a relatively gentle transition to other energy sources (which, after all, will eventually become necessary anyway).

"It would be preferable to have energy technologies that don't emit carbon into the environment," says Ken Caldeira of Lawrence Livermore National Laboratory, "but until such technologies come on line, it would be better to think in terms of ways to minimize the amount of carbon in the environment."

Biomass and Leaky Sinks

To understand these, however, it's first necessary to understand the Earth's carbon cycle. Carbon dioxide enters the atmosphere from several sources. It is exhaled by animals (and bacteria), produced by the burning of carbon-containing fuel (wood, coal, oil, natural gas, etc.), and spewed out of the earth by volcanoes. It doesn't build up in the atmosphere indefinitely, however. Instead, it is pulled back out of the air by several processes, collectively known as "sinks." The best known of these is photosynthesis, by which green plants use the energy of sunlight to split carbon off of carbon dioxide, using the carbon to grow, and returning the oxygen to the atmosphere. Because carbon is the critical ingredient in all of these processes, they are called *carbon* sinks rather than carbon dioxide sinks, and the entire complex feedback mechanism is called the carbon cycle.[9]

Plant growth is, of course, merely a temporary carbon sink, because plants eventually die and decompose (or are burned). This releases their carbon back to the air as new carbon dioxide. But plants do hold a substantial amount of carbon in temporary storage (equivalent to more than 100 years of fossil-fuel emissions), and increasing their total biomass will increase the size of this storage locker. That's why reforestation can play a role in offsetting global warming—at least until we run out of convenient places to grow trees.

Of particular interest is the fact that the rate at which plants are removing carbon dioxide from the atmosphere appears to be increasing, at least in North America. There are a number of explanations for this, including the regrowth of forests on previously logged lands, the encroachment of forests onto abandoned farmlands, and accelerated plant growth spurred by global warming or increases in carbon dioxide. The most recent explanation is that this enigmatic "North American carbon sink" might be enlarging due to increases in rainfall caused by warming-induced climate shifts.[10]

Plant-based carbon sinks, however, have one major drawback: they're reversible—or "leaky" in the argot of carbon-cycle models. Carbon sequestered in plants can rapidly find its way back to the atmosphere via forest fires or growth-impeding climate shifts such as droughts. Longer-term solutions for global warming would do well to use carbon sinks with a better chance of permanence.

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[9] For more detail on this subject, simply type "global carbon cycle" into your favorite Internet search engine. The results will include web pages from the geology departments of many major universities.

[10] See Ramakrishna Nemani, et al, *Geophysical Research Letters*, 28 May 2002, published online at *www.agu.org.*, or Richard A. Lovett, "Rain Might Be Leading Carbon Sink Factor," *Science*, Vol. 296, 7 June 2002, p. 1787.

One way to create a more permanent carbon sink would be to dig a bunch of very big holes and bury yard waste, corn stalks, and other biomass in them where it can't decay. In a few million years, all of that biomass might even generate new fossil fuels. In practice, though, this isn't a very realistic solution. The holes would have to be *very* big, dwarfing all of the world's present landfills. And the process of burying all of that plant matter would probably wind up sequestering important nutrients along with the carbon, stripping farm and forest lands of productivity.[11]

Soda Seas

Another carbon sink is the ocean. Carbon dioxide dissolves in seawater, and the more carbon dioxide there is in the air, the more there is in the water. It has been estimated, in fact, that nearly 30% of humanity's seven billion tons of annual carbon emissions wind up in the sea.[12]

One proposal is to speed this up by bubbling carbon-dioxide-rich air through coastal waters. The difficulty is that the ocean is another leaky reservoir, especially in its surface waters. Dissolved carbon dioxide will quickly fizz back into the atmosphere, not quite as spectacularly as the release of carbon dioxide from a suddenly opened can of soda, perhaps, but rapidly enough that efforts to dissolve the gas in shallow water might not really accomplish much. If you want the carbon dioxide to *stay* in the ocean for a reasonable length of time, you need to inject it much deeper.[13]

Peter Brewer and coworkers at the Monterey Bay Aquarium Research Institute (MBARI) have attempted this on a small scale, at a depth of 3,300 meters, discovering that it indeed works. In the deep sea, carbon dioxide bubbles are under so much pressure that they have the texture of squishy blobs of gelatin. Better yet, they're so dense they sink rather than bubbling back to the surface. This means that they definitely stay put long enough to dissolve—which in Brewer's small-scale project took about two weeks.

Larger-scale projects would involve creating "lakes" of carbon dioxide on the ocean bottom. These lakes, too would dissolve, but the turnover between deep ocean waters and the surface is so slow that it would be many, many years before a substantial fraction of this carbon dioxide found its way

[11] When nature buried plant matter in the processes that formed existing coal and oil fields, it did so much more slowly. That allowed soils to regenerate any nutrients that might have been lost along with the carbon.

[12] From a presentation at the Dec. 2001 AGU meeting, by Ken Caldeira of Lawrence Livermore National Laboratory. See also James F. Kasting, "The Carbon Cycle, Climate, and the Long-Term Effects of Fossil Fuel Burning," www.gcrio.org/CONSEQUENCES/vol4no1/carbcycle.html.

[13] Carbon dioxide sequestration needn't be done solely at sea. A land-based proposal involves injecting the gas into deep aquifers or wells, where high-pressure and impermeable geological structures will (hopefully) contain it. This is a good idea in theory, but it faces two major obstacles: (1) injecting all of this gas underground will alter an area's hydrology, potentially in ways we'd rather not do; and (2) the storage reservoir might leak. A small leak simply returns the stored carbon dioxide to the atmosphere, where it's now free to contribute to global warming. A big leak can be deadly. Carbon dioxide is heavier than air, and will collect in low-lying areas, displacing the breathable atmosphere. In 1986, a volcanic lake in the Cameroon Republic released an enormous bubble of carbon dioxide, suffocating more than 1,700 people. Any attempt to store large amounts of carbon dioxide below ground raises the same risk.

back into the atmosphere—and for reasons we'll discuss in a moment, there are hopes that much of it won't return at all. Thus, ocean-bottom sequestration does appear to be one way of getting rid of the gas for substantial periods of time. Getting it to the ocean bottom in megaton quantities, of course, would be a major engineering feat. But so is the construction of fossil fuel power plants.

The biggest problems with ocean-bottom sequestration other than the cost (and the amount of energy required to pump all that carbon dioxide into the depths)[14] are ecological.

In an effort to find out what these consequences might be, the MBARI team that conducted the sequestration trial also monitored the impact on deep-sea creatures. Not surprisingly, they found that these creatures are unlikely to fare well in the vicinity of a large carbon dioxide outfall. When carbon dioxide dissolves in water it forms carbonic acid in strengths high enough to do serious damage to nearby organisms. In the MBARI experiment, the dissolving carbon dioxide created an acidic plume that drifted with the current, killing sea cucumbers and sea urchins in cages placed nearby. The acidity was so bad that it dissolved the sea urchins' spines.

The problem, says Brewer's coworker, James Barry, is that although deep-sea creatures are accustomed to a cold, dark, high-pressure environment that we would find harsh, they're also accustomed to a very stable environment. This means that they have limited ability to adapt to changes, such as the influx of acid. Deep-sea animals also live in ecosystems where there is relatively little food, giving them little energy to waste adjusting to environmental changes.

Barry concludes that deep-ocean carbon dioxide sequestration must be viewed as a form of waste disposal, with the concomitant environmental damage. Whether that damage is acceptable depends partly on its scale—the more carbon dioxide that we dump into the ocean, the more damage we will cause. On the other hand, the more carbon dioxide that we dump into the ocean, the less there will be in the atmosphere—and the less damage there will be to terrestrial ecosystems. It's a tradeoff, and much more research is needed to determine whether the benefits justify the costs.

Or, as one scientist commented after listening to an update on the MBARI research at the December 2001 meeting of the American Geophysical Union, deep-sea carbon sequestration is an arena in which humanity should "proceed with caution and be brave enough to stop if necessary."

Bicarbonate of Stone

On first blush, deep-sea sequestration simply looks like a way of getting rid of carbon dioxide for a few generations. Eventually, deep ocean waters circulate back to the surface, and dissolved gases will leak back out into the air. But as was hinted a few pages ago, the ocean can do more than simply store carbon dioxide. It can also get rid of it. There are several ways that it can do this, but the one of most use for global-warming prevention is the carbonate weathering cycle.

Carbonates are rocks containing carbon bonded to three atoms of oxygen, plus another atom, such as calcium or magnesium. The simplest is calcium carbonate—$CaCO_3$ to chemists, but "limestone" to everybody else. It's also a major constituent of bones, eggshells, and coral reefs, and there are a lot of carbonate deposits on the sea floor: the accumulated remains of generations of shellfish.

Forget for the moment the fact that carbonates contain carbon. What matters is that they are soluble in water. Particularly in acid water. The carbonate weathering cycle is simply the process by which nature dissolves them. In the ocean, it occurs when acidic sea water attacks carbonate deposits—or the spines of sea urchins, for that matter. On land, it occurs when rain or surface water dissolves limestone outcrops or percolates into the ground to hollow out caves such as Carlsbad Caverns. The more carbon dioxide there is in the water, the greater its acidity and the faster the limestone dissolves.

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[14] These costs are not insignificant. Caldeira and coworkers have estimated that ocean bottom sequestration could cost more than $100 per metric ton of carbon dioxide, and require more than 20% of the power output of the fossil-fuel plant whose emissions are being abated.

The relevance to global warming is that the weathering process consumes carbon dioxide by combining it with carbonates to form chemicals called bicarbonates. It's not a truly permanent process: if there's enough bicarbonate around and little enough carbon dioxide, the bicarbonate will fizz out carbon dioxide and re-form carbonates—like Alka-Seltzer tablets plopped into water.[15] But the oceans can store *a lot* of bicarbonate before that happens.

Nature will eventually use the carbonate weathering process to rid the air of excess carbon dioxide, but it would take 5,000 to 10,000 years to smooth out the type of spike in carbon dioxide levels that human activities can create in a matter of decades. One of the goals of injecting carbon dioxide into the ocean is to speed up the process by increasing the acidity of the deep-sea waters.

Greg Rau of the Institute of Marine Sciences at the University of California, Santa Cruz, however, believes he has found an even better way to speed up this process, using some very simple technologies.

The first step is to "scrub" power plant emissions with water sprays to dissolve as much of the carbon dioxide as possible. (The same technique is already used to take sulfur dioxide out of high-sulfur emissions.) Next, Rau would use the acidic carbon dioxide broth to dissolve limestone, mined for the purpose at nearby quarries. To speed the process up so that it can keep pace with the power plant's emissions, he'd grind the limestone to powder and mix it with water to form a slurry. The powdered limestone dissolves much more quickly than large chunks of rock—for the same reason that stirring granulated sugar into a cup of coffee sweetens the beverage more quickly than just dropping a lump into the cup and letting it sit.

The bicarbonate-rich but carbon-dioxide-depleted water would then be dumped into the nearest ocean.

One good thing about this idea is its simplicity. Another is that the waste product, calcium bicarbonate, is relatively innocuous. Overall, Rau estimates that it would cost about $24 per ton of carbon dioxide scrubbed from the air. About half of that cost is in building, running, and maintaining the equipment; the rest is for hauling limestone and pumping large quantities of seawater—costs that could be minimized by siting facilities in coastal areas rich in limestone deposits.

Also good is the fact that the world has a lot of limestone—about 10,000 times as much of it as it has of coal. But for each ton of carbon sequestered from the atmosphere, it's going to require the quarrying of about a ton of limestone—a project that would require strip mining on a scale comparable to that used for coal mining in such places as West Virginia. It's not impossible, but it's a substantial commitment of land, and energy.

Perhaps the ultimate solution, therefore, is to turn carbon dioxide into stone.

Harnessing the (Biochemical) Power of Oysters

Now is the time to remember that the carbonate in our bones contains carbon. So do the carbonates of oyster shells, coral reefs and—for that matter—limestone, which is what you get when geological processes convert any of these into stone. And before it entered the food chain, most of that carbonate was carbon dioxide gas. This means that carbonates represent an absolutely enormous carbon sink—compared to which humanity's carbon dioxide emissions are but a tiny blip. Creating new carbonates from carbon dioxide is the Holy Grail of carbon-sink research. Nature does this slowly, via the growth of oyster beds and coral reefs. Humans need an industrial process, like a fast-acting, artificial oyster.

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[15] It's exactly like Alka-Seltzer, in fact; the fizzy antacid is comprised mostly of sodium bicarbonate.

Gillian Bond and other researchers, mostly from New Mexico Institute of Mining and Technology, think they've found the way.

Their goal is to harness the process by which shellfish use carbon dioxide to create their shells. It's a multi-step process, but the key is an enzyme called carbonic anhydrase. In addition to being present in shellfish, it's found in a wide variety of animals and plants, where it performs functions unrelated to the sequestration of carbon dioxide. Currently, it can be isolated from animal blood, but a commercial carbon dioxide sequestration process would require a less expensive source—presumably implanting the relevant gene in bacteria and harvesting the enzyme in a biotechnology facility.

So far, the research is merely preliminary. The researchers have found that the process works, and that each molecule of the enzyme can immobilize a great many molecules of carbon dioxide. They've also found that the enzyme still works in the presence of chemicals such as lead or mercury, traces of which may be present in power plant emissions. But a they're still a long way from designing a production-scale facility that generates carbonates cheaply and efficiently.

Success would give us the ability to create large amounts of stable minerals that can't belch carbon dioxide back into the atmosphere—at least not for millions and millions of years:[16] long enough, Bond hopes, to satisfy even the most conservative environmentalist. On the other hand, we're still talking about the creation of an enormous amount of waste. Each ton of carbon dioxide removed from the air is going to produce nearly two tons of calcium carbonate—and global carbon dioxide emissions are measured in *billions* of tons per year. Some of it could probably be used in making concrete, for which crushed limestone is a major ingredient, but we're going to have to put the rest of it somewhere.

"The magnitude of the problem is enormous," says James A. Edmonds, of the Joint Global Change Research Institute at the University of Maryland. Simply to stabilize atmospheric levels of carbon dioxide by the middle of this century, he says, it will be necessary to sequester up to 20 billion tons of carbon—nearly 80 billion tons of carbon dioxide—per year. If this is to be done, it will probably require an assortment of technologies, each contributing its part to the overall solution. But Edmonds also thinks that it will require an enormous level of effort, something that he calls a "global Manhattan Project"—aimed not at developing a weapon of war, but at controlling one of the side-effects of humanity's increasing prosperity.

Now if that's not fodder for a science fiction novel, I'm not sure what is! ■

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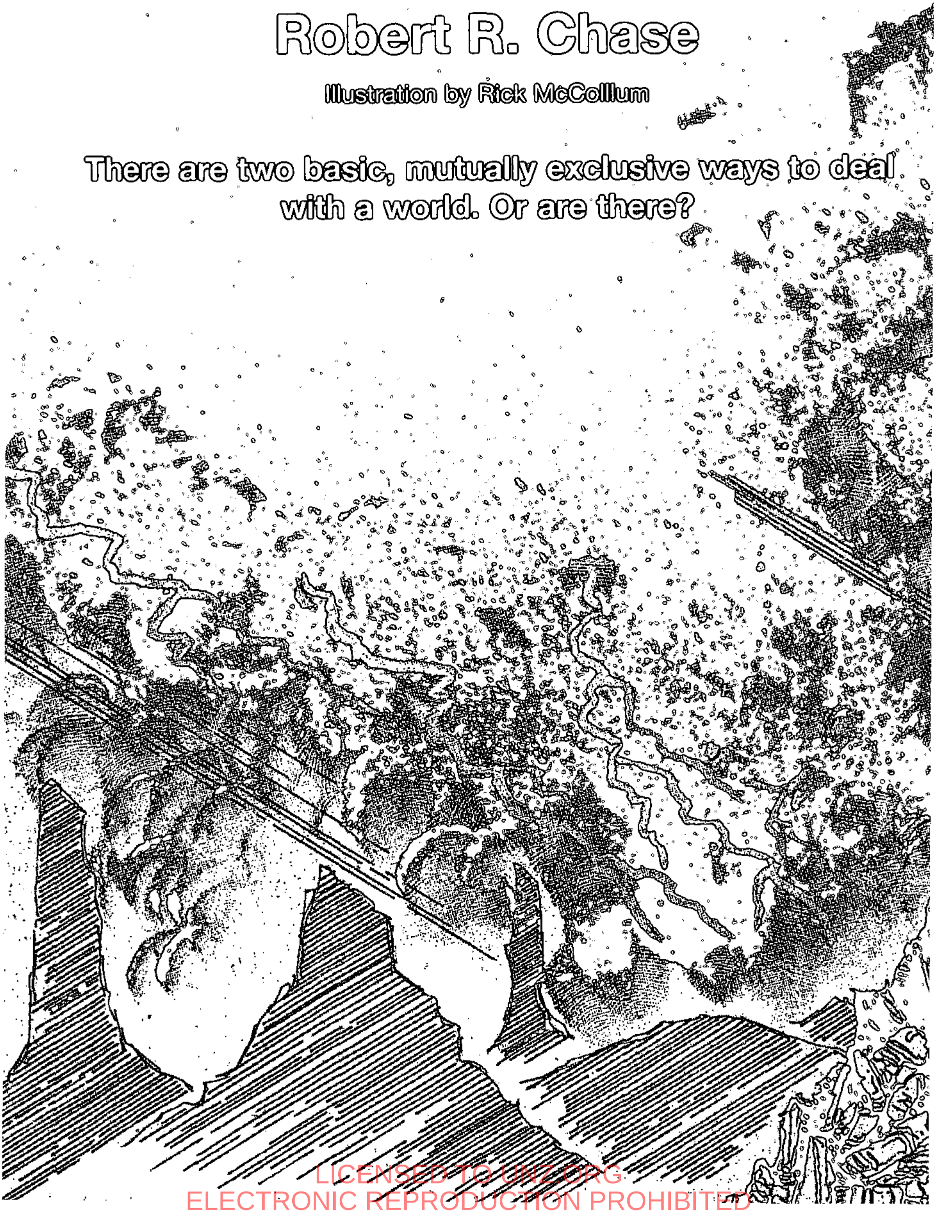
[16] Even carbonates aren't a permanent carbon sink. If they were, the earth would long ago have sequestered all of its carbon in this form and life as we know it would have ceased. In the long run, seabed limestone deposits are drawn into oceanic trenches by the action of plate tectonics (continental drift). There, they are subducted deep beneath the surface, where the heat of the Earth's mantle bakes the carbon dioxide out of them, replacing it with silicon. When this magma spews from a volcano, the carbon dioxide gas froths back into the atmosphere to start the cycle anew. This, however, is a very, very slow cycle, requiring many millions of years for carbon to progress from volcano to shellfish to ocean trench and back to volcano.

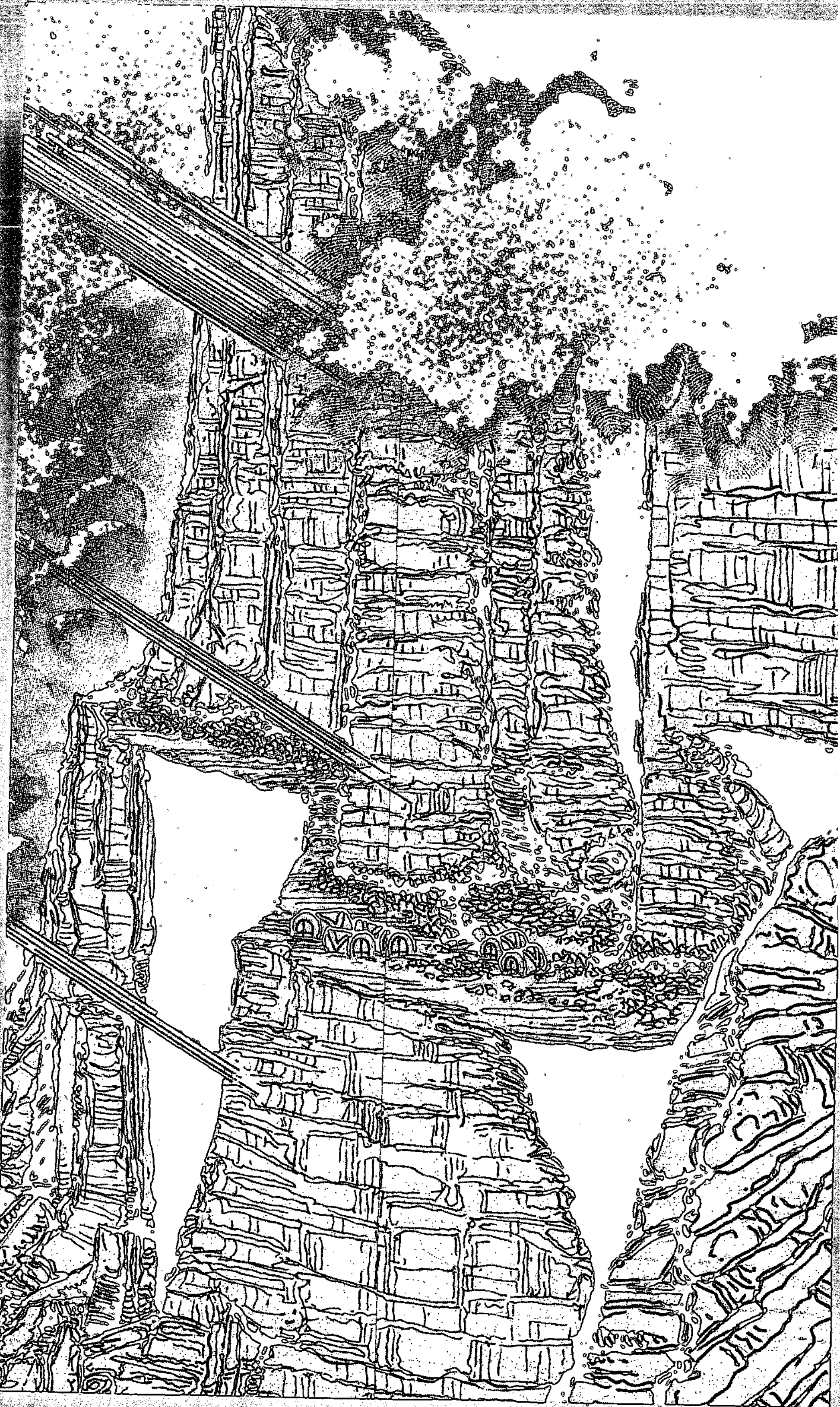
THE MEETING OF PILGRIMS

Robert R. Chase

Illustration by Rick McCollum

There are two basic, mutually exclusive ways to deal with a world. Or are there?





The VTOL landed with a bone-jarring thump. The pilot grimaced apologetically as Park unsnapped his safety harness and opened the door. As soon as Park was on the tarmac, the engines crescendoed to full power and the VTOL jumped into the sky. The downburst from the props nearly sent him sprawling. Apologetic or not, the pilot wanted to spend no more time than absolutely necessary near the Changeling's Castle.

From the landing pad, though, it did not look forbidding or even impressive. A long, low building of concrete with a smaller second story over the center. Staff sleeping facilities. There were no other buildings on the mesa. There were no roads. All construction materials had been flown in. Now, it was rarely visited save for supply ships.

The windows were barred. He wondered if that was to keep something in or out, and then realized that they probably served both purposes.

"Fitzhugh-Watanabe? Freeholder Fitzhugh-Watanabe?"

Park nodded at the woman who had come out to meet him, straining to make out her words over the ringing in his ears.

"I'm delighted you agreed to come. I'm MedMaster Connie Pye-Miller."

Park took her extended hand. He was looking down on a woman with sharp, almost birdlike features. Her wheat-colored hair might have been styled with bowl and scissors. She was dressed in the khaki blouse and shorts that were the unofficial uniform of MedServ.

"Come with me and I'll introduce you to our other guests."

Park shouldered his duffel bag and followed along behind her. "It's difficult to turn down an invitation signed by the Minister of Public Safety."

Connie looked at him uneasily. "That's true." She seemed about to say more, but then thought better of it.

The entry to the castle was as imposing as any of the building of the General Court at the Terraces. Inside, however, it was deserted and poorly lit. You could almost imagine that it was haunted. And if that was too imaginative for you, you could remember that there were reasons why the castle had been built on this small mesa accessible only by air.

By humans, that is.

Connie must have seen his unease in his face. "We don't usually have many visitors here. Our staff is small. Every so often, we get someone from Public Safety with a new set of interrogatories for the Changeling. And sometimes the Changeling itself asks to speak to someone. We had an astronomer here last week, and they seemed to spend all their time talking about planetary albedoes and the solar constant."

She shrugged. The inexplicability of the Changeling's actions was proverbial. "Our guests are downstairs in the library."

Park accompanied her down a wide winding staircase. Light streamed from large double doors near the base of the stairs. There was an unintelligible murmur of conversation.

Connie stopped just short of the door, as if something had suddenly occurred to her. "You know Kent Bainbridge-Keating, don't you?"

The name hit him like a blow. "You could say that. At least, I did once. Is he here?"

Connie nodded. "It was before my time, but I should have remembered. I hope you won't be offended, but it might be better if you waited on the balcony until the meeting begins."

Park nodded abruptly, not trusting himself to speak. They strode quickly past the open door to the end of the hallway. "I'll come for you when things get started," Connie promised. "Now that you are here, it shouldn't be long."

The balcony was the one part of the building which looked like it might actually belong to a castle rather than to a strictly utilitarian government building. Flagstones paved its wide expanse. The concrete railing had been formed to resemble finely worked wooden slats and spindles. The attempt to break away from the stark drabness of the rest of the building was touching, if not completely successful.

A deep rumble washed up from the depths. Standing at the railing, Park gazed down on the thunderheads building two kilometers below. Lightning glowed within the ominously dark clouds. Storms had grown both more frequent and more violent of late. The thought reminded him that he should be back at his own freehold, ready to help Maisy and the boys get the sheep and pigs to shelter if a similar storm was approaching them. Nearly every freehold had suffered storm damage of some degree.

The door behind him opened and closed quickly. Bare feet slapped the flagstones.

". . . man's a total moron," a voice said, "not to mention a complete bigot."

Park turned to find a woman in a simple blue dress approaching him. Long brown hair was pulled back in a ponytail. She held her hand straight out in a stance not unlike that of a pistol marksman.

"You are Park Fitzhugh-Watanabe?" she asked. "I am Nova."

Park took her hand, frowning at the unusual single name. "The head of the Naturalers?"

Nova repressed a smile. "There is no head of the Natural Way Movement. It is just that for its own reasons there are some of us the media chooses to concentrate on."

Right, Park thought. The impression he had gained from the media was that all Naturalers lived for publicity. Nova's one word name proclaimed her contempt for tradition and for the First Families whose names might be lost.

"You are the man who knee-capped Kent Bainbridge-Keating," she continued.

It was like a slap in the face. For more than ten years, half the Skiland population had considered him a racial traitor. Kent's baby boy, Hamilton, had been kidnapped by the White People, native Skilanders, and the Changeling left in the boy's place. Park and Kent and others nearly recaptured Hamilton when the White People contacted Park. At least, he had believed it to be real contact and not a dream. The exchange, he was given to understand, would eventually pave the way for real understanding between the two intelligent races on the planet. Park had believed that important enough to shoot Kent and leave Hamilton with his captors. Even friends who agreed with his action knew enough not to mention it.

"A shame you didn't aim higher," Nova continued. "The man is totally insufferable."

Park found himself getting angry. "He used to be my favorite uncle."

"Well, you are not his favorite anything. I came out here because I couldn't stand his ranting any—"

A loud clap of thunder drowned out the rest of her sentence. Looking over the railing, Park saw the thunderheads racing up the cliff face. Lightning flashed within the clouds almost continuously. Nor was it confined to the clouds. Blue jets jumped from the thunderheads to the darkening sky above them where they were met by red flares that seemed to explode like fireworks.

The hairs on Park's forearms began to stir. Flares and jets seemed to be converging on the balcony. "I think we had better go in," he suggested.

"It's nothing to be frightened about." Nova's wide eyes belied her calm words. "It's just a natural phenomenon."

"In my experience, most of the things that maim or kill you are natural phenomena." Park took her elbow and guided her to the door. As he stepped inside, he nearly bumped into Connie Pye-Miller.

She startled back. "I was just coming to get you. Everything is ready now."

Her eyes flared as she saw Nova, but she pressed her lips together and said nothing.

Rain splattered the glass doors behind them. By the time they reached the library, it had become a constant, heavy drumming. "Well, at least we are getting rain this time. There have been more and more storms lately, but all they seem to bring is lightning and wind."

Thunder crashed so loudly that the whole building shook. The lights went out. Park stood still, extending his hands until they touched the door frame. Slowly, the lights flickered back to life.

"Fitzhugh-Watanabe." The voice was old and dry as kindling. "I said that if we ever met again, my laser would do the talking."

Kent Bainbridge-Keating sat in a wing-backed chair, the lamplight gleaming off the metal brace encasing the lower portion of his left leg. When Park had seen him last, he had been in his prime. Now he looked shockingly old and frail. At his side stood a man about Park's age. Davis Bainbridge-Keating, Kent's eldest son.

"Enough of that talk, Freeholder." The voice, coming from the side of the room, was deep and surprisingly gentle, but it carried the unmistakable ring of authority. "I wouldn't like what I would have to do if you seriously threatened anyone here, but I assure you that you would like it even less."

The speaker wore the field uniform of an Executive Security Officer. Laser, nightstick, and communicator dangled from various parts of his belt. His mustache was trimmed with military precision. The nameplate over his shirt pocket read Stevenson-Chung.

An older man, bald save for white tufts of hair above his ears, stepped between them. "Please, gentlemen, I am sure that we can put aside past enmities for the common good." He turned to Park. "Freeholder Fitzhugh-Watanabe, I apologize for asking you to wait outside. I wanted to minimize the frictions as much as possible. Let me make introductions. I am Dr. MacBride Hall-Wallen, the chief resident here. You know your uncle and cousin—"

That brought a grunt from the elder Bainbridge-Keating.

"—and you met Connie on the landing pad. I see you have met, um, Nova as well. Officer Stevenson-Chung has been provided to us by the Ministry of Public Security. And, finally, Dr. Reynolds Morrill-Landers is the last of our invitees."

Park shook hands with all but the Bainbridge-Keatings. He cocked his head in puzzlement he came to Morrill-Landers. "I have the feeling I should know you."

"Rey established the basis of Convergence," Nova said warmly. "He showed that the microflora of Skiland could exist within our bodies. Not only exist, but make us healthier at the same time. He demonstrated that the planet had accepted us, that humans were no longer aliens on this planet."

Morrill-Landers' glance showed both annoyance and embarrassment. "What I did was explain why the inhabitants of Far Edge Township did not suffer from the allergies that used to be so common. Not that much of a big deal."

Park remembered the story. If half what he had heard was true, Morrill-Landers, "Rey," was being far too modest.

The elder Bainbridge-Keating cleared his throat impatiently. "Now that we've all made nice with our city manners, perhaps you will be so kind as to explain why you have dragged us away from our freeholds this close to harvest time?"

"Well, the first thing for you to understand," Hall-Wallen said, "is that I am not the one who summoned you here."

"What do you mean by that?" Park asked. "You countersigned the summons I received from the Ministry of Public Safety."

"Well, yes, that was a necessary formality," Hall-Wallen said uneasily, "but the one who actually asked for this meeting, and picked out your names was, well—"

"I was the one who chose," a new voice said.

It had entered through the door at the far end of the library. Seen from the corner of Park's eye, it could easily pass for human. Only when you looked closely could you the blue and greenish blotches beneath the skin, and even then you would not immediately notice that those blotches moved. Its speech, though clear, was softened with a suggestion of gurgling. When you listened closely, you could hear the changed intonation caused by speaking while inhaling.

The worst thing was the clear resemblance to the Bainbridge-Keatings.

Kent made as if to rise. Stevenson-Chung stepped forward. Davis put a restraining hand on his father's shoulder. Kent settled back into his chair without relaxing, his eyes glaring with an implacable hostility.

"Thank you for your being here," the Changeling said. "The presence of all is greatly important."

"I did not come here at the bidding of that thing," Kent said.

"The Changeling requested the presence of all but one of you by name," Hall-Wallen said. "But when the Ministry of Public Security suggested the presence of a security officer, I readily complied."

"It is an honor to be in your presence," Nova said, stepping forward to the Changeling. It towered over her. "It is shameful that you have been confined here as if you were some kind of dangerous beast. We must learn your ways if we are ever to be at home on this planet."

The Changeling's face tensed and contorted in what would have been a smile had the underlying musculature allowed it. In response to Nova's gesture, it extended its hand and allowed it to be grasped. Nova's smile seemed forced as she pulled her hand away.

"I have not been confined," it replied. "Time spent has been learning much. Dr. MacBride has supplied for all needs physical and informational."

The Security Officer regarded Hall-Wallen with mild interest. "All of which was cleared through the Ministry of Public Safety before being provided," Hall-Wallen said quickly. Stevenson-Chung nodded without saying anything.

"Your people are many minded," the Changeling continued. "Thoughts pull against each other, are in tension like the parts of this structure." Its hand moved vaguely to encompass the entire castle. "Some have wanted to remake parts of this planet into islands of your lost Earth." He seemed to be looking at Stevenson-Chung. He turned back to Nova. "Others wish to disguise yourselves as those you call the White People.

"Parts of this world you have taken into yourselves and found it no bad thing." His gaze went from Morrill-Landers to Park. "One of you dream-spoke with us, and so became a . . . a bridge . . . between our peoples."

"He betrayed his race," Kent said harshly. "He maimed me to keep me from taking my boy back from your thieving White People. Any sane government would have hanged or at least imprisoned him." He glared at Stevenson-Chung. "Instead our precious General Court passed a law immunizing this traitor from civil or criminal sanctions.

"You took my boy from me. What more do you want to steal from us?"

"Nothing is to be stolen," the Changeling said. "All is to be returned. Myself to the lower lands. Your boy to you."

There was a moment of stunned silence. "You'll give my boy back to me?" Kent asked hoarsely. "When? Where is he?"

"He is in the lower lands. I will lead all you."

"The hell you will," Kent said. "If you know where he is, we can get in a VTOL and go get him."

The Changeling moved its head rigidly left and right. "There are concerns. Time is needed—"

A loud clap of thunder interrupted it. "There are the storms," Park said thoughtfully. "No VTOL pilot would be eager to go below the Mists and expend fuel looking for a clearing while a storm could blow up without warning. By the same token, those storms are dangerous to anyone going on foot. And the longer our exposure, the more likely getting hit."

"I am sure the Changeling would be able to guide us between storms," Nova said. "Or show us how to protect ourselves."

"The storms are becoming more violent," the Changeling said. It was hard to read emotion in its words.

"There's another problem," Morrill-Landers said. "Depending on how far below the Mists these particular lower lands are, we will be experiencing three or even four atmospheres of pressure. I'm not sure how we would react to that."

"Divers on Old Earth worked under much higher pressures than that," Davis objected.

Morrill-Landers raised an eyebrow at this bit of ancient history. "Okay . . . But I believe that divers on Earth exercised complete control of the gases they would be breathing under those pressures. We will have no such control. What little we know of the lower lands indicates that there are micro-climates and even micro-atmospheres beneath the canopy. Some places are said to experience carbon dioxide blooms, which are deadly to all animal life until they disperse."

"Both our freeholders endured increased atmospheric pressure when they went . . ." Nova faltered, looking at Kent. "When they tried to rescue young Hamilton twelve years ago."

"We went down slowly, on foot." Park said. "Our bodies had time to adjust. That was even more important on the way back up."

"You would need a depressurization chamber if you tried to do the same in a VTOL," Morrill-Landers confirmed. "There is one on this planet, at the College of Apollo. Unless our destination is at the base of that mount, I see no way we could get to that chamber before suffering irreversible damage."

"Then have Hamilton brought up near the castle's cordon," Kent said. "We can make the exchange there."

Again, the Changeling swung its head rigidly from side to side. "They come up already, but you must take me down. Only in meeting may both places be resumed."

"Freeholder, we are directed by the General Court to cooperate with the Changeling in every legal way," Stevenson-Chung said to Kent. "The Changeling came to us voluntarily and has always been free to leave." An excusable falsehood since it was the official line of the current administration. Previous administrations had considered the Changeling a prisoner, and one had nearly had it executed. "Retrieving your son is clearly a legal act. But you are not required to participate in it."

Kent banged the metal brace on his leg. "My participation in a trek below the Mists has been made impossible," he said, glaring at Park.

"The participation of your son, Davis, has not been made impossible," Stevenson-Chung said evenly. "However, if I judge that the animus of the Bainbridge-Keating clan to be such as to endanger any member of our expedition or any of the White People we may meet, he will stay up here with you while we rescue your youngest. Do I make myself clear?"

Kent nodded, arid hostility in his eyes.

"One moment," Park said suddenly. "Aren't we missing something? If the Changeling has been kept here in isolation all this time, how does it know that its people will bring Hamilton up to meet us?"

Rey's eyes widened as he wondered why that question had not occurred to him.

"The winds brought their words," the Changeling said. "I pulled the words into me as now I tell you."

"I don't—" Rey began.

"I think I can explain," MacBride said. "It appears that the White People have a language that to a large degree is based on scent. Their sense of smell is extremely sensitive. The Changeling first told me about bringing Hamilton back after it had been standing on the balcony in storm winds for six hours. So the winds did bring the words."

Park digested that in silence.

"Then if there are no further questions—" Stevenson-Chung began.

"Soon, how soon?" the Changeling asked.

Stevenson-Chung glanced at Hall-Wallen, who nodded. "The rest of our supplies will be flown in here tonight as soon as the storm lets up. We should be able to start an hour after first light."

Park was up an hour before first light. Shredded dreams seemed to fly away as he opened his eyes. There had been glimpses of the White People, their tentacular manes writhing about their heads. There had been other creatures, grazers that somehow fed with mouths growing from the base of their pendulous stomachs. Worst of all, there had been the feeling of suffocation as a fungus forced itself into his mouth and up nose, sending tendrils into his brain.

This is stupid, he thought, swinging his feet to the floor. It would be best to face the rigors of the day's trek with a full night's sleep, but if that was impossible, he might as well get up and shave.

The hallway was still quiet as he stepped out of the bathroom and took the stairway up to the balcony. The French doors were already open. Davis Bainbridge-Keating stood at the railing looking east. Park hesitated and took a step back.

"Come on out," Davis said without turning. "I don't own this space."

After a moment's internal debate, Park accepted the offer. The sun was below the horizon, but its brilliance reflected off the underside of the clouds high above them.

"Do you know what's out in that direction?" Davis nodded toward the east. "About six hundred kilometers dead ahead?"

Park frowned, summoning up a mental map of the planet. "None of the major townships. And we're pretty much beyond the perimeter of the frontier freeholds. The location of Changeling's Castle was chosen to be as isolated as possible. The only place more isolated—oh!"

"Yes," Davis said approvingly. "Starport. Watch now! I think it is clear enough that in just a moment we should see—there!"

Even at this distance, the shuttle's exhaust flame was almost too bright to look at directly. The spacecraft moved steadily up, pierced the clouds and continued up beyond them, its flight path already beginning to curve to take advantage of planetary rotation. At the launch site, the roar would have been overpowering, shaking the entire mesa. Here, there was only the sighing of the wind.

"With this flight, they will complete the conversion of the *Utnapistim* to a full time space station," Davis said, enthusiasm warming his voice. Park nodded, remembering the nights when, as a boy, he had tracked the dot moving with unhurried majesty across the night sky and tried to imagine it as the starship which had brought his great grandparents to this planet.

"They will be constructing a new set of satellites, and setting them in orbit to keep complete watch on our weather. We'll be able to predict these storms, and maybe learn to lessen their ferocity somehow.

"There is even talk of sending an expedition out to Snowball. The astronomers say that it's much warmer than the records of the first generation indicate. There's an equatorial band that should be habitable. If we started seeding the waters with oxygen producing organisms, we could have a breathable atmosphere in a generation."

"And so you would make all the same mistakes and more that we have made with this planet."

Nova had come up behind them silently. "For some reason, we always take the most destructive approach. We came to this planet, found it bursting with more intense life than Earth in its prime, and it terrified us. We blasted the tops off mountains, sterilized them with radiation, then surrounded them with cordons of poison to keep from being infected. Now you want to go to another planet and disrupt its natural state. And the antimatter that is being created for the engines could destroy half this world. Don't you see that the lesson the Changeling has been trying to teach is that we can live with this planet, we do not have to dominate or remake it?"

Davis' face had been becoming steadily more animated as he talked. Now the life seemed to drain away from it.

"You have always wanted to be a space ship pilot," Park said, on a sudden surmise. "Or somehow involved in space."

"Not that it matters," Davis muttered. "My father is getting on. He wants to keep the freehold in the family. And I'm the only child he has left."

He brushed by Nova without another word. She stared after him, looking undecided between triumph and guilt. "Well, I was only coming to tell you that breakfast is ready."

"I don't think Davis has much of an appetite," Park said.

Despite the implication of the previous evening, the first part of their trek was by VTOL. They crowded into the claustrophobic dimness of the cargo bay. The pilot told them to grab a strap.

"Gonna be a short ride and I don't expect any turbulence, but you never know. No point in breaking a leg this early in your trek."

The Changeling stood directly in front of Park, hands down at its side. Either it had not heard the pilot, or had chosen to ignore him. This close, Park could smell it. A trace of ammonia mixed with other, unidentifiable scents. Not an offensive odor, exactly, but definitely not human.

The engines revved up, a high-pitched whine superimposing itself on a growing thunder. Park felt it lurch as it lifted. It side-slipped, swung uncertainly for a few seconds, and *dropped*. Park clutched at his strap, in his imagination seeing the VTOL fall down the 500 meter cliffs, get caught by crosswinds that slammed it against the rocks.

The engines roared more loudly, as if the pilot were desperate to regain control. Then, slowly, the noise level tapered off. The deck tilted slightly in the direction of the cargo door. Stevenson-Chung pressed a button on the wall and the door swung down to become a gangway.

"Everyone out," he shouted. Or at least Park, still partially deafened, thought that was what he said.

They stepped out onto a meadow that slanted away from the base of the cliff. One of the VTOL's stubby wings brushed up against vertical rock. Park's imagination had been close to accurate. When he looked over the rest of the meadow, he realized why the pilot had taken the risk. He had landed on the most nearly horizontal portion of the meadow. Away from it in all directions, the incline became increasingly severe, until it disappeared in the mists swirling below them.

Park and the others hauled their packs out of the VTOL and slipped them on. At Steven-Chung's direction, they chose partners and checked out each other's packs as the security officer read off items from a list.

"We did this back at the castle," Nova

complained. "I don't know why we have to do it again."

Park looked up from checking Morrill-Landers' pack. "Because we don't know where we are going or how long it will take us to get there."

"But we can be pretty sure that we will not be resupplied until we get back," Rey agreed.

Nova grunted and tore into Dr. Hall-Wallen's pack with what appeared to be excessive enthusiasm.

"All right, folks, here's the marching order. Changeling is first 'cause he knows the way. Fitzhugh-Watanabe is next, because he is the only one of us with any real experience below the Mists. Then Dr. Hall-Wallen, so he can be close enough to detect any important changes in his former charge. Morrill-Landers, I want you pretty much in the center of the column in case any of the humans need any sudden medical help. Nova comes next. Davis, I want you right behind Nova. And I'll take rear guard to make sure we don't lose any strays."

The Changeling had been standing alone, staring down into the Mists. It began to move down the slope as soon as Park came up behind it. Park looked around quickly to see Hall-Wallen trotting up behind him, then hurried forward to keep up with the Changeling.

The vegetation in the meadow appeared to have been derived from terrestrial species, probably from seeds blown down from the castle grounds. As they made their way down the increasingly steep slope, nearly all of it disappeared, leaving a surface of treacherously loose rock. They descended into the Mists, which seemed to dissolve in front of them, creep up on both sides, and then surround them in a gray, clammy wetness. Sounds were magnified. The clatter of a stone kicked by a boot as it bounced down the side of the mountain and was lost in the void. The creak of backpack harnesses. The continuous hum of precipitators sucking in air and squeezing the humidity into their canteens.

Several members of the party were already panting so loudly they sounded as if they were on ventilators. Only the Changeling was completely silent, moving forward at a steady pace, picking out a path by no means visible to Park. They switched back and forth at irregular intervals. At one point, Park became convinced that the rocks two meters above them were the trail they had traversed an hour before. But there was no way to be sure.

"Could we make a stop soon?" Nova asked.

There was no answer from the Changeling.

"I said, could we find a place to rest some time soon?" Nova's voiced sounded ragged.

Again, no response. Park reached out to get the Changeling's attention.

"No place no time," it said suddenly. And then it accelerated the pace almost to a trot. Park hurried to catch up, afraid that he might lose sight of it. Behind him he heard someone curse as he twisted an ankle on wet rock.

Then they were below the Mists. A freshening breeze whipped the sweat off Park's face. If anything, though, the visibility was worse. Park had a few seconds to wonder about that as the Changeling led them out onto a broad ledge and halted.

Stevenson-Chung was quicker on the uptake. "Set up your shelters. Now!"

The sky was almost completely black. Distant explosions of yellow and green light were followed by growling detonations of thunder. The wind shifted back and forth with increasing strength.

Park unfolded his tent and pressed the pressure button. Air hissed in between the inner and outer wall, causing the tent to heave itself up in front of him.

Stevenson-Chung strode along the ledge, assigning tent mates and making sure the shelters were safely positioned.

"What do you mean, move it further

out?" Davis objected. "This is the furthest spot from the edge."

"You're at the base of the slope," Stevenson-Chung said. "If a wash comes down this part of the mountain, you'll have a short but starring role in a waterfall."

"There aren't supposed to be midday storms," Nova complained. "Did you know about this when we started? Isn't the government supposed to warn us about these dangers?"

Stevenson-Chung's eyes seemed luminous in the gathering darkness. "Yes, it is. And I'm sure you know that the government is trying to put up a full coverage satellite network. But there are those who find all this technology offensive and unnatural. Why don't you have a word with them when we get back?"

Davis gave a short bark of laughter.

Huge drops of water began to fall around them. They exploded on the rocks like miniature water balloons.

"Park, you're with Rey." Park nodded. "And I'm putting the Changeling in with you two. You've had the closest contact with the White People in the wild, and I want Rey to be able to observe the Changeling as closely as Hall-Wallen has."

Something about that explanation did not ring completely true, but there was no point in arguing. Certainly the Changeling could not be put in the same tent with Davis.

"Everybody, put your gear in your tents as soon as they're up. You'll want the weight to hold them down. Wish this weren't solid rock," he muttered to himself.

"Why?" Rey asked.

"Wind's coming," Stevenson-Chung said. "I would've liked to have staked down the perimeters."

As far as Park was concerned, the wind was already here, driving the rain into his face. He stowed the rest of his pack in the tent, shuffled around Rey who was doing the same, and stuck his head out the tent flap. He could see the other tents quivering under the twin assaults of wind and rain. The Changeling stood facing the gale, its arms spread wide.

"C'mon in," Park shouted. "We've got a place for you."

The Changeling looked at him impassively, then turned back to the wind.

"Damn if I'm going wrestle him in here," Park muttered. He secured the flap but left a small gap at the base to make it easier to open if the Changeling decided to come in.

Lightning flashed through the sides of the tent, followed immediately by earsplitting thunder.

"I have a sudden sympathy with Nova," Rey said. "We really aren't supposed to have midday storms like this."

"Something must be playing hell with the Forecasting Service," Park said. "I can't believe Steve would have started us down this morning if he knew this would hit so soon."

A sudden thought hit him. "The Changeling knew, though. That's why it was hurrying us down the slope so fast, not giving us any rest stops. It knew that we could not survive if we were caught in the open without a chance to set up our shelters."

"It seems to like—hold on!" Rey shouted. A sudden gust of wind lifted up one side of the tent. Park threw himself down, using his own weight as an anchor. Fingers of wind probed beneath his arms and his knees as if trying to find leverage to grab him and toss him aside. The rain battered his back through the tent cloth. The tent lowered itself around him. He remembered in a small part of his mind that that was a good thing: the air-pressured walls were flexible, and would yield to force rather than breaking or tearing. The other part of his mind wanted to scream in claustrophobic panic.

It continued that way the rest of the afternoon and night. The wind attacked the tent from all sides. Lightning flashed so brilliantly that it seemed to x-ray the tent, followed by thunder that shook the stone ledge beneath him. The upper part of the tent quivered alarmingly under a bombardment of hailstones. At one point there was a sustained roar, and Park wondered if the entire mountain was coming down on them.

A little while later, while wondering if it would ever let up enough for them to eat, Park fell asleep.

The world was utterly still when Park crawled out his tent the next morning. The sky was the color of milk. A landslide had stopped just short of Davis' tent before losing its forward momentum as it slipped off either side of the ledge. There was the smell of cooking sausage.

"What do you mean, you're hungry?" Stevenson-Chung was saying. "You had plenty of food in your kits."

"With nothing to burn and no portable micro," Davis complained.

"Why would you need 'em?" the Security Officer asked. He popped the lid of a can, twisted its base, and set it on the rock. "Self-heating rations. Best thing the military ever re-invented."

"Only useful thing the military has ever done," Nova sniffed.

Park grinned despite the fact that he and Rey had been equally ignorant.

MacBride Hall-Wallen came over and sat down next to them. "I've made sure the Changeling has its food. It wants to get underway soon."

Nova looked over at the far end of the ledge where the Changeling was eating by itself. "Why isn't it allowed to join us?"

"It is allowed to join us," Hall-Wallen said. "It stays by itself out of consideration. People tend to find its mode of eating disconcerting. And . . . its appearance seems to be altering. I'm not sure why."

"Prejudice and chauvinism," Nova said. She picked up her ration packs and went over to sit next to the Changeling. Hall-Wallen shrugged and went on eating with the rest of the expedition. Nova said nothing when she came back to repack her tent but, to Park's eyes at least, her face had taken on a greenish pallor.

Examining the Changeling, Park was able to confirm Hall-Wallen's words. The Changeling's "hair" was falling out in clumps. Its skin was distinctly whiter. It had discarded its mountain shoes. The feet had spread out, and the heels had extended and perhaps even become jointed.

The going that morning was easier than it had been the day before. The incline had lessened, and the Changeling was willing to give them five minute breaks every hour. It was noticeably warmer. Park had to blink sweat away from his eyes.

Whiteness spread out from the side of the mountain beneath them. At first, Park thought it was another cloud layer, like the one they had descended through the day before. The he saw the long, slow ripples, like waves on a large lake.

"That must be the canopy below," he said, during their second stop. "When we tried to rescue Hamilton, the foliage was all greens and blues. Have you ever seen anything like it?"

"No," Rey agreed, "but you have to remember how little of this planet we know, even after four generations. You made your descent two thousand kilometers from here. This part of the great forest may have looked like this for centuries."

Park became aware that the Changeling had come up quietly and was staring at him. "Strength in whiteness." The Changeling paused, searching for words. Its voice had become harsh and blurred. Whatever change it was undergoing was having a deleterious effect on its fluency.

"Whiteness hurls back the burning." As if for emphasis, it smashed a multi-jointed fist into a palm.

"I don't understand," Rey said. "What

do you—" But the Changeling turned away from them and was descending the slope, signaling that their break was over.

The canopy rose slowly toward them and by noon they were even with its highest fronds. That was when they received an unwelcome surprise. The Changeling had led them to the brink of another cliff. Stevenson-Chung called a halt for lunch and to consider the situation.

"There is a tree which has fallen against the cliff," he said. "Sheared its top off when it hit. Changeling seems to be saying that we can use it to get down to the forest floor."

"Climb down a tree?" Park asked incredulously. "I looked over the edge a few minutes ago. I'd say it's fifty meters to the ground. What sort of handholds does this tree have?"

"Doesn't matter," Steve said. "There is a central channel not quite a meter wide at the top. Changeling says it widens as you go down."

"Crawling down the inside of a tree doesn't sound like my idea of a good time," Davis said. "It will be dark. We will be totally at the mercy of the Changeling or whatever else may be in there."

"You shouldn't be so paranoid," Nova said. "Still," she turned to the Security Officer, "couldn't we get a VTOL to take us to the base, like we did yesterday? That would be both faster and safer."

Steve gestured in the direction of the forest canopy. "We went through most of this yesterday. You see anywhere out there where a VTOL could land after it picked us up? I don't. Nor do our maps, for whatever they are worth."

"So from here on in, we have no backup and no way of being pulled out if we are attacked," Davis said.

"That's a fair assessment," Steve admitted.

"Why should the Changeling do anything to harm us?" Rey asked. "Even if the White People were to declare war on all humans, how would getting rid of us further their aims?"

"I think that's right," Park said. "And I guess I'm something of a fatalist. We have been on the Changeling's turf for two days. My guess is that if it decided to do away with us, there would be damned little we could do about it. So we might as well go forward."

Even Davis eventually agreed, however reluctantly. But when it came Park's turn to follow the Changeling down the heart of the trunk, he had a moment of claustrophobic panic. The opening was barely large enough for him to squeeze into on his belly. It was completely dark and filled with strange smells. Only the warm breeze coming up from below convinced him that there was an opening at the far end, and so gave him the courage to proceed.

The interior was rotten. His knees and elbows sank into it, forcing up lukewarm, foul smelling liquid. Soon he came to a perverse appreciation of this. The angle of descent was steep. A hard, smooth surface might have sent him tumbling to his death. As it was, he was enlarging the hand and foot holds created by the Changeling going before him.

A chittering sounded ahead of him and swelled in volume. Park squeezed his eyes shut and buried his face in his arms. Then the swarm was on him, thousands of tiny feet in his hair, on his neck and back. *The "smell" of terrestrial amino acids is generally unsavory to Skilandian life forms.* So you were taught. But you also learned that some creatures would take a good bite out of you before they realized they did not like the taste.

Abruptly, they were all behind him. He heard a shriek, and then a curse. His smile was entirely involuntary.

There was more than enough time to wonder about the tunnel down which he was crawling. Did it serve the same function an artery, or esophagus, would in an animal? Terrestrial trees had no such open conduits, but Skilandian flora had received its labels only by analogy. If it was taller than a human, more or less rooted in the soil, and making energy by some process like photosynthesis, it was a tree, no matter how different the processes might be that gave rise to those appearances.

Soon Park was too tired to wonder about anything other than how soon they would emerge at the base of the tree. Knees and elbows smarted from chafing. Arms and back had become one huge ache. Yet up ahead there seemed to be light, however dim, and that kept him going.

Eventually, the tunnel split open above him. Park climbed wearily out and collapsed on the forest floor. Rey followed him, and then Nova. The shadowy bulk of the cliff rose to one side. The white ceiling of the forest swayed above them, parting briefly sometimes to reveal a glimpse of sky.

"You look like hell," Rey observed. "Did you use your face to enlarge the tunnel?"

Rey's own face and arms were smeared with black. Park wiped his cheek and looked at the grime on his hand.

The grime that was moving, bunching up and then smoothing out as it spread from his fingers to his palm to the back of his hand—

He was on his feet, rubbing his palms together furiously, scraping at his face, when two large hands with spidery fingers grasped his wrists and turned him around. Eyes totally black save for green and blue flecks stared into his.

"No. *No!*" the Changeling insisted. "(unpronounceable) good. Cool-cold."

Park looked to the other members of the expedition for help.

"It might be," Hall-Wallen said, rubbing his chin absently as if unaware of the same black patches on his own face. "We've studied micro-mites that are colony creatures. They like salt, which they can get from our sweat. But they wick up the rest of the sweat as well and spread it over a greater surface area. The result is that we feel cooler. And if the current temperature is any indication, we will be grateful for anything that cools us off."

"I don't know . . ." Park said, though it felt at least five degrees warmer here at the base of the cliff.

"Why the doubts?" Davis asked maliciously. "After all, if the Changeling intended harm, he could get rid of us at any time, right?"

In the end, they radioed the situation to the castle staff and decided to leave the micro-mites in place. Despite their piebald appearance, most of them did feel slightly cooler.

Only when he and Rey had set up their tent that evening did Park have time to notice the strangeness of the forest. It was quieter than it had been on the slope, but all the sounds seemed no more than an arm's length away, even when he could tell that it was coming from somewhere outside their range of vision. Hall-Wallen suggested that it was probably an effect of the higher atmospheric pressure.

That had other effects as well. When the self-heating mechanism on one of Davis' ration packs failed to work, he snapped off the limbs of a small, dead bush and made a fire. The flames burned with a fierce intensity, reminding Park of a magnesium flare.

"Nuh-*uh*!" The Changeling appeared next to the fire, kicking dirt over it. It seized Davis' coffee ration and broke it open, pouring it on the ashes. Davis came up swinging his knife. Park grabbed his wrist barely in time to keep the blade from striking home. The Changeling made no move to defend itself.

"Let me go," Davis demanded. "You saw how it attacked me."

"It attacked the fire," Hall-Wallen said. He bent down and crumbled the half-burnt twigs between his fingers. "As I would have if I had been a little smarter and a little faster. This undergrowth is tinder dry. Put that together with the higher atmospheric pressure and you have all the conditions for a blast furnace."

"Really?" Davis said. "I thought there had been two damn severe storms in the last few days. I guess I must have been hallucinating."

"Most of the water doesn't get down this far," Rey said. "Skilandian plants absorb most of their water through their leaves. The root systems are primarily for support. Did you notice the dust our footsteps have been kicking up? I did, but I didn't think what it meant until now."

The Changeling stepped away from them and disappeared into the darkness. Park felt Davis relax. He released his hold.

"I understand how disconcerting that was," Nova said. Her own voice was shaking. "We are all filthy and tired and our nerves are on edge. But just a day or two more and we will have your brother back. Concentrate on that."

"I do concentrate on that," Davis said. He stared into the darkness, in the direction the Changeling had disappeared. "I think about how every day that creature looks less and less human. I see the micromites on us and I think of how long my brother has been down here. I have dreams about how much they may have changed him. That frightens me the most. In those dreams, he has changed so much, so *horribly*—"

His voice broke. After a minute, he steadied himself and continued. "That the only mercy I can do my little brother is to kill him."

The next day had no morning. This far under the canopy, total darkness gave way to a half-light which persisted for several hours before succumbing again to total darkness. The land kept dropping away, though less precipitously than on the previous days. Three times they had to descend into gullies left by streams coming off the mountain. They were dry save for trickles of water along the very bottom. Once, Park was startled by a mouth which suddenly gaped open two meters away from him. In the still dimness at the bottom of the ravine it was difficult to gauge distances exactly, but the maw must have been a meter wide. A long, tubular body extended into the shadows behind it. It made no sound, nor any move to attack.

Park scrambled up the far side of the ravine. Later, he remembered that the mouth had been smooth, without fangs or teeth of any kind. It must have been stranded there after the last rains. There had been no threat. It had been begging for water.

Noon brought them to a clearing. Park squinted against the unaccustomed brightness. Something looked wrong.

"Stay back," he said suddenly. "This is tanglegrass. It will wrap around your legs and trip you, then wrap around your arms and neck to hold you down. That's when the bloodbirds dive from the clouds and embed their blood-sucking little beaks in your arteries." It had happened to several of the party who had first tried to rescue Hamilton Bainbridge-Keating.

"Dead tanglegrass," the Changeling said. "No bloodbirds."

Park looked skyward, and saw other members of the party doing likewise. Nothing could be seen against the steel gray brightness of the sky. Small skeletons crunched beneath their feet. The tanglegrass itself was dry and brittle. However many creatures it had trapped in the past, it could do so no longer. They made it across the clearing and back into the forest shadows without being attacked.

The trees here were widely spaced, almost like the pillars of a cathedral. The footsteps of the party, their occasional words, the creak of harness all emphasized the quiet. For the first time, Park wondered if Nova and some of her colleagues might, in a small way at least, be right. Since the first landing, humans had cut themselves off from this planet, attempting to create small islands of Earth on the mountain tops. Maybe they did not have to be afraid. Maybe they could actually be part of the natural planet.

Park shook his head. Maybe the Skilandian symbiotes in his blood were not quite as effective as the Changeling believed and he was beginning to suffer something like nitrogen narcosis.

They came to one more clearing late that afternoon. This was far larger than the tanglegrass meadow, extending a hundred meters in front of them down a gentle slope and to either side until it was lost in the mist. The trees on the edge of the clearing were leafless, and blackened as if burnt. In front of them, rows of white, globular flowers stood atop implausibly thin stalks. As Park watched, two of the flowers detached themselves and ascended quickly into the sky.

For the first time, the Changeling appeared uncertain. It sniffed the air, and then chose a path where most of the plants had already lost their flowers.

A cooling breeze sprang up, blowing against Park's face. Inexplicably, his eyes began to water. So it was only as a blurred shadow that he saw the Changeling pivot and lash out with its arm. He took the full force on his chin and went down. The Changeling leapt over him. There were shouts and muffled thuds.

Park forced himself to his feet. More balloon flowers had broken free and were floating over them. Rey and Hall-Wallen sprawled on the ground. Nova was picking herself up. Stevenson-Chung had dropped into a fighter's crouch and was waiting for the Changeling's charge.

Davis leapt on its back, pulled his forearm tight into its throat. The Changeling shrugged him off almost casually. Davis' head brushed against the bottom of one of the balloon flowers. It popped open, disgorging a white mist.

Davis screamed, clawing at his eyes. The Changeling grabbed him and rushed him back under the trees.

Things were happening too quickly. Stevenson-Chung ran after the Changeling. Park staggered along in their wake, his breath rasping in his throat. The Changeling had dropped Davis and was rubbing his face with soil. The security officer unholstered his laser, thumbing off the safety.

"No!" Rey said. "Park, hold him back. The Changeling is trying to help."

Park turned to confront Stevenson-Chung, all too aware that the security officer would not need the laser to dispose of him. Stevenson-Chung grinned, having immediately come to the same conclusion.

"I don't want to shoot anybody," he said, speaking to Rey while not taking his eyes from Park. "If you can explain what the hell is going on here, maybe I won't have to."

The Changeling was washing Davis' face with his canteen. It emptied, and the Changeling held out a hand to Rey. Rey unclipped his canteen from the precipitator, and handed it over.

"It's something about the plants," he began. "The Changeling is frightened of them and was trying to protect us. I think—"

Park erupted in a fit of coughing. Acridness filled his throat and nose. He wiped his mouth when he was able to stop. The hand came away covered with blood.

"Oh, my," he said distantly. "This can't be good."

"The balloon flowers are filled with acid," Rey said.

Park lay on his back, pleasantly doped up. They seemed to be on the far side of the swath of flowers, though he could not remember how they had traversed it. It was dusk.

"Not filled," Hall-Wallen corrected.

"They would not be able to float if they were filled with acid. There is a lighter than air gas, which I suspect is hydrogen, that provides the lift. When I examined the flowers, I discovered that the skin of the balloon is composed of an inner and outer membrane. It appears that the acid is contained between the two. The air pressure lowers as the balloons rise, causing them to expand. At some elevation that must cause the balloons to rupture naturally. It was our bad luck blew them in our direction."

"The point is, the Changeling was trying to protect us," Rey said. "As soon as the balloons drifted in our direction, it knocked us down in the hope that they would pass over us."

"And why exactly did it try to drown me in dirt?" Davis reclined in a corner, a dark cloth tied across his eyes making him look like a historical romance's picture of a Zen master.

"The soil has a high pH value," Hall-Wallen said. "It acts as a base. The Changeling was trying to neutralize the acid and flush it out of your eyes."

"Too bad it didn't do a better job."

"It saved you a great deal of pain and your sight," Rey said sharply. "It did everything possible given the changes to its vocal chords." A wave of uneasiness went through the group. The Changeling was now completely in the form of the White People. It was almost unimaginable that it could have passed for human a week ago.

"Did it do enough?" Nova asked. When no one seemed inclined to answer, she continued. "Davis is temporarily blind. Park inhaled that mist and I don't know what it has done to his lungs. Can we take care of them and still go forward?"

Almost as one they turned to Stevenson-Chung. He forced an unconvincing smile. "One of my favorite sayings supposedly comes from Old Earth itself. 'When there are no alternatives, there are no problems.' I got patched through to the Security Ministry an hour ago and received the response I expected. No one is coming to take us back. We have been too deep for VTOLs for days. For that matter, the only open area for landing less than a day's march away is the grove of balloon flowers.

"Beyond all that, the Powers That Be are very concerned that this mission succeed. They believe it crucial that the Changeling be returned to its people and that Hamilton be retrieved. We are to continue with the mission unless it is physically impossible to do so."

Park seemed to be floating over the camp. The voices of his friends were soothing, like a breeze sighing outside his bedroom window.

"Is it physically possible to continue with one member blind and the other blissed out on pain killer?" Nova asked insistently.

"I think so." How odd to see Stevenson-Chung uncertain of himself. He looked over to Hall-Wallen for support.

"The Changeling indicates that we should reach our destination by noon tomorrow," Hall-Wallen said. "The pain killer will have worn off Park by tomorrow morning. His lungs were clear the last time I listened, so he should be able to walk, though he may be weak. And we can guide Davis that far."

"The alternative is to leave Davis and Park here with a tent and a day's supplies tomorrow," Stevenson-Chung said. "Then we can pick them up on our way back."

"I don't much like that idea," Davis said.

Although he was too relaxed to speak, Park mentally nodded in agreement.

"Then that is your answer," Stevenson-Chung said.

Park awoke the next morning with the worst sore throat of his life and eyes that watered on the slightest provocation. Nonetheless, he breakfasted on soup broth and fruit juice and declared himself ready to go. Stevenson-Chung made him Davis' guide and placed the two of them just in front of him at the rear of the column. Park kept a light hand on Davis' sleeve, speaking only to warn him of rough ground in front of them.

The march that morning was the easiest since they had begun the trek. The ground was even and almost flat. Enough light made it through the upper canopy for Park to see and avoid the small holes or other obstacles that might have caused him or Davis to stumble. There were no balloon flowers, no tanglegrass, no bloodbirds or other predators. Aerial crabs hurled themselves from branch to branch far above them but never descended to ground level. They stopped for a water break five minutes for every hour because of the constantly increasing heat. Save for that, they could almost have been on a Sunday stroll.

A few minutes before the scheduled noon break, they came to a small clearing. There was a shout from the front of the line. Shadowy figures rose up and approached. White People with knobby hides, limbs with too many joints, and slowly writhing, tentacular hair. Except for one. Slender, not quite as tall as the others, with hair that had been recently cut in an unsuccessful attempt to make its wearer look like a young farmer of the upper mesas. Even under the piebald patching of the micromites, the resemblance was unmistakable.

"Are you here to take me back?" The voice was stiff, overly formal, yet at the same time uncertain. "Can you understand me? I have studied all the programs we could pick up on the vidcom from a crashed VTOL. Where—"

Davis jerked himself free of Park's hand and stumbled toward the voice, his hands outstretched.

"Hammy, is that you?" Davis tripped on a tree root and would have fallen if the younger man had not caught him.

"Are you my father?" Hamilton asked wonderingly.

Davis ran his hands almost hungrily over the youngster's face, running his fingers through the hair, rubbing the ears, pressing his thumbs along the cheekbones, outlining the eye sockets, brushing gently over the lips with his fingertips.

"No. I'm Davis, your brother. Father is up above, waiting for us. He has waited a very long time for you."

They embraced. "We have kept our part of the bargain," Davis said after a few moments. "Let's start back."

"Not yet," Hamilton said. "We need to talk. We need your help."

They sat in a circle. Humans alternated with White People, although Davis and Hamilton sat together. The Changeling sat on Hamilton's other side. Park sat in the midst of a group of White People. They seemed to know him and were intent on pressing food, or at least what looked like food, on him.

"The Lineage remembers you," Hamilton said. "Of all who came after me when I was taken, only you could understand Dreamspeech. And you understood enough that you opposed" he gestured at the other humans, "your own lineage."

Park nodded, remembering the fungus which, for a brief time, had linked him to the White People and to a multispecies consciousness that had seemed to embrace the entire planet. That consciousness had wanted to learn about the creatures who had come from another star and remade part of this planet in the image of Old Earth. It had chosen Hamilton, thinking that a young child might be flexible enough learn the ways of the Growers. It had left in his place the Changeling to learn as much about human culture as possible. In time, they might serve as translators for their peoples.

"What we need now must be spread far beyond the capacity of Dreamspeech."

Hamilton had raised his voice to address all of them. The Changeling beside him snorted and droned in a language thought to be at least half scents. "All humans must hear and ponder. And then they must decide.

"This is the oldest story, the story I was first taught. The Growers grew the ecosystems of this planet with the care and patience a human might devote to . . . to a bonsai tree." Hamilton looked pleased with himself for having come up with the metaphor. "They have done this for, I can't tell you how long, but in Dreamspeech I look at the earliest skies and see the stars in different groupings than those of today."

"Just as I have always said," Nova muttered. "They work with the living things of the planet. They live naturally, as we should."

Hamilton listened carefully to the Changeling, who was apparently being prompted by others of the White People. "For long and long, the Growing was full . . . and lush . . . and balanced. But the balance has become increasingly difficult to maintain. The waters go into the skies, but no coolness comes from them. The air becomes thick. The linkages by which the living feed into each other are broken."

"All the result of human meddling with the environment," Nova said.

The Changeling seemed to become agitated. "No, this started long before humans came to the planet," Hamilton said. "When the Growers saw our ancestors plane off the tops of mountains and clothe them with plants of a sort never before known, it filled the Growers with hope. They thought that you, that we, might have the power and the wisdom to do what we, they could not."

Stevenson-Chung shook his head ruefully. "That is a mighty flattering idea of our abilities. I'm afraid, though—"

"Wait a bit," Rey said. "Those balloon flowers we ran into. They must have been under the control of these Growers. Why would you want to throw acid into your air?"

"Venus," Davis said suddenly, and began to laugh.

"What?" An image from school of a female double amputee flashed through Park's mind. "What does mythology have to do with this?"

"Not mythology," Hall-Wallen said. "Astronomy. Venus was a planet in Earth's solar system. Closer to the Sun that Earth, if I remember correctly."

"A hell-hole," Davis said. "Hot enough to melt lead, covered with sulfuric acid clouds. These growers have been trying to turn this planet into Venus. That would be one sure way to get rid of us."

Hamilton grimaced as he tried to find words for the Changeling's rapid fire chatter. "They realized that the increasing temperature was causing most of the changes and that our sun was responsible for the heat. They thought that if they could make more clouds, and make those clouds more . . . reflective, that would help. The mists in the flowers do that."

He listened again. "But it hasn't been enough. Only when Ubaratep, the Changeling, talked to one of our astronomers did he realize the full extent of the problem. Our sun is going to continue to get hotter. The Growers can do nothing to stop it. Conditions on the world will become more and more hostile. Eventually, everything will die.

"Unless humans can prevent it somehow."

"This can't be right," Park protested. "If we were half as smart as you say, we would never have settled on a planet that was going to become uninhabitable in a dozen generations."

Stevenson-Chung shook his head sadly. "I'm afraid you haven't had time to study prelanding history. The Changeling may be right. There were only a handful of habitable planets within the range of our arkships. If you are on a planet that is already burning up, a dozen generations on a new planet will seem like a great deal.

"More importantly, remember that

our ancestors thought they knew more about stellar evolution than they actually did. They believed they had billions of years before Earth's Sun would begin to swell to a red giant. Our star was thought to be safer because it was smaller, and so it would evolve more slowly. And so it has. Only perhaps not as much more slowly as we would like. We have the technology and some theories that are at least half good. The Growers have a baseline of observations which seems to extend back at least a hundred thousand years."

Nova looked sick. "What do you think we can do for you?"

Hamilton translated the Changeling's answer. "They don't know. They only know that we have techniques beyond those of the Growers. They ask if we could blow away part of the sun so that it might not burn with so much heat. Or could we bring a comet into orbit and break it apart to become a ring that would shade our planet like . . ." He looked around for inspirations. "Like your hat brims."

"We can't do either of those things," Davis said sadly.

"You shouldn't even want to," Nova expostulated, turning from Hamilton to the Changeling. "You are trying to imitate all the mistakes of Mankind's overly technological civilization."

"They have tried to live in harmony with nature," Hamilton said. "Now nature is dying. They do not wish to die with it."

The meeting broke up soon after that. It would take the Skilandian government generations to study the assertions made by the Growers and decide what to do about them. If it was possible to do anything. Changeling and human youth were with their respective peoples, and that was as much as could be expected for now.

Rey and Hall-Wallen were deep in a discussion of ecological minutiae. Davis was not about to let Hamilton get beyond his reach, and he seemed to want Stevenson-Chung close by to protect his younger brother. Nova stood apart, obviously unhappy, talking to no one. Park was about to go over to her when he felt a light touch on his arm.

The Changeling had come up behind him. Its metamorphosis was complete. It was almost impossible to believe that it had ever looked approximately human.

"Dreamspeak us."

Park felt his heart thud. He forced himself to nod.

The Changeling led him to a group of White People, who indicated that he should sit. One coughed something into his hands. Park recognized it. One of the White People had thrown it at him ten years before. It had catapulted him into Dreamspace. Afterwards, there were some who wondered if he was still completely human.

Rough hands smeared the goo into the back of his neck. It burned slightly as it sank beneath the skin. Other hands—such strangely jointed hands which he now saw had two thumbs each—pressed gently against his chest, forcing him to lie down. The ground was dry and surprisingly comfortable. Voices murmured antiphonally around the circle.

He noticed without surprise that he was now looking down at the White People and his own body. His senses expanded outward, embracing the whole planet. For the first time, he understood how the Growers had tried to incorporate all life on Skiland into themselves, to make themselves into something like the Old Earth myth of Gaia. He felt the biosphere groan as it tried to adjust to the slowly increasing heat, and Park felt that pain in every joint and muscle. He saw humans through the eyes of the White People and through the eyes of creatures he had never seen and felt the agonized hope that human mechanisms would be able to do what Grower biotechnology could not.

(In the distance, he could hear the members of the General Court, not yet aware of the magnitude of the coming calamity, arguing over price support and water policies. The voices were as dry and meaningless as the sound of hail on window glass.)

Without transition, he was back on the balcony of Changeling's Castle conversing with Davis. It was an absolutely clear night, the stars almost painfully bright. On the horizon, the shuttle mounted its pillar of flame. This time, Park could hear its roar in the distance.

"There is even talk of sending an expedition out to Snowball," Davis was saying. "The astronomers say that it's much warmer than the records of the first generation indicate. There's an equatorial band that should be habitable. If we started seeding the waters with oxygen producing organisms, we could have a breathable atmosphere in a generation."

In his mind, Park followed the shuttle beyond the atmosphere, beyond the huge, pitted bulk of the *Utnapistim,* the starship that had taken the first generation of humans to Skiland, to a planet whose ice fields were broken only by a scattered handful of volcanoes. As he swooped down near the equator, he noticed lakes of melt water forming, expanding, linking up with one another.

Now he became aware of the others who were with him, looking through his eyes, assessing what he saw with minds unlike his own. Their thoughts were like the sound of forest leaves in the wind. They considered the increasing sunlight that was slowly turning the ice into a narrow ocean which would circle the world.

And suddenly Park knew the answer was being given to him. He knew (although he did not know the names, for they had no names in human tongues) of the organisms that would thrive in that cold water, that would absorb the increasing sunlight and liberate oxygen into the atmosphere. But they formed only the foundation. On them, layer on layer of living systems could be built, cycling nutrients through endless ecological loops, expanding into every available niche and creating new niches, fine tuning a planet to support the maximum amount and diversity of life. The plan was far too intricate for him to comprehend. He could only sense the outlines of something at once as simple and complex as a fractal, as ornate as a baroque cathedral.

Dawn light filtered onto the forest floor. Park was sitting against a tree staring at the Changeling. Behind him, he could hear his companions beginning to stir in their tents. There was no sign of the other White People.

"It hardly seems fair," he said. His cheeks were wet with tears. "After all this time, we have only begun to understand this planet, to understand you. Now we are going to lose it all."

Yet he wasn't really thinking of the planet as a whole, of the Growers and the White People. He was thinking of how hard he and Maisy had worked to make a go of their freehold, how they had wanted to leave the boys something growing and prosperous. Even though the Great Dying might be several generations in the future, farming seemed to have lost much of its point.

The Changeling scooped forest soil into one hand and let it sift out through its fingers. It stood.

"Not all lost," it said. Its voice was rough, as if it hurt to speak. "We . . . will . . . live."

It turned and walked away. In a matter of seconds it was lost in the shadows. Rey called to him, and he went over to make ready for the ascent to human lands. ■

(EDITOR'S NOTE: This story is a sequel to "The Changeling Hunt" [July 1987], and "The Wellness Plague" [October 1995].)

The Robot Who Knew Too Much

Ron Goulart

Wherein the detective and advertising businesses collide in an unlikely way and place.

The blimp was only a few minutes out of Greater Los Angeles and still rising toward its ultimate altitude, when Maggie Quincade sat up straight in her Biz Class seat and uttered several mild obscenities.

The handsome, sunbrowned thirty-four-year-old man sitting beside her pulled his hand away from her bare knee. "I'm sorry if my collegial pat has upset you, Maggins," he apologized in his deep, rich voice. "Even though we're business rivals, the cozy little dinners we've had of late in various and sundry trendy bistros around Greater LA had led me to believe that—"

"Hush up, Dante," advised Maggie, a slim dark-haired woman in her early thirties. "I wasn't even aware that you were attempting to fondle me."

"That's decidedly odd, since my cordial caresses are usually—"

"And for Pete's sake, don't call me Maggins."

"I thought it was a pleasant little pet name that you and I—"

"*You* like it, not *I*." Maggie, unhooking the safety gear, smoothing down her short sinsilk skirt, stepped into the aisle of the blimpliner. "See that big hulking goon up there in First Class?"

"That huge chap in the bulky overcoat and beret?" asked Dante Bodeen, squinting slightly as he looked through the now-open doorway of the First Class section, "By George, that's a robot, isn't it?"

"Darn right," she answered, angry. "It's Ben."

"Isn't Ben your former husband? But I heard he was running your branch of Quincade & Quincade Advertising in Lima, Peru."

"Lisbon actually. I transferred him."

Bodeen brightened. "Ah, I get it. This is that robot who has a chip copy of Ben Quincade's brain in his skull," he remembered. "There's been quite a lot about this robot fellow on the vidwall newscasts lately. Seems he's turned into quite a capable private investigator and set up—"

"Hooey. He's a bigger pain in the neck than the flesh and blood Ben Quincade." Her hands fisted at her side. "As for his being a capable detective . . . hooey."

"Maggins honey, you and Ben—both Bens—seem to have some unresolved—"

"I'll be back in a minute. While I'm gone, try to work on never using the word Maggins again when you're anywhere near me." She went stamping down the aisle and into the more luxurious First Class section of the AeroBlimp passenger dirigible.

Just beyond the threshold, a lovely blonde uniformed android attendant said, "May I see your First Class boarding tattoo, ma'am?"

"I'm not traveling First Class," she informed the blonde mechanism. "I can't afford a First Class passage, unlike some wacky and extravagant people . . . make that wacky and extravagant walking junkpiles who—"

"Then I fear you can't—"

"It's okay, Muriel," called the big silvery robot. "The young lady is my business partner and I can vouch for her."

"Fine and dandy, long as you say so, Benjie." The pretty andy smiled and stepped aside.

"Benjie?" inquired Maggie.

"It's my pet name for him," explained the attendant.

With a forefinger that was quivering with anger, Maggie pointed at the robot version of Ben. "How long have you known the guy?"

The android consulted the watch built into her believable and freckled left wrist. "Just shy of eleven minutes, ma'am."

Saying nothing further, Maggie moved into the First Class section of the still climbing dirigible and halted next to the robot's aisle seat. "You look, as I've mentioned on prior occasions, Ben, extremely goofy in that overcoat, not to mention that dippy beret. Robots aren't supposed to wear any—"

"I'm still not, as *I've* mentioned before, Maggins, used to being a robot. My innate modesty prompts me to cover my nakedness. Be that as it—"

"Where'd you pick up that dreadful nickname for me?"

When the robot tapped his left ear, it produced a mild *bong*. "As a Guardbot, I had exceptional hearing to begin with and I've improved it greatly with some touches of my own," he reminded her. "Why are you fraternizing with that simp from a rival ad agency?"

"We're simply journeying to the same Central America destination. Being cordial to the competition simply means that I'm a good sport, Ben, and not rolling in the darn hay with the guy."

With some rattling and clanking, Ben shifted himself over to the window seat. He patted the now empty aisle seat with a big, silvery metal hand, suggesting, "If you're going to brag about your romantic life, Maggie, why not sit down and lower your voice a bit?"

Her nostrils flared as she glanced around at the twenty-some other passengers in the section. Several of them immediately stopped looking in her direction. "Isn't someone sharing this row with you?"

"Nope, I booked both seats." He patted the cushion again. "I figured that sooner or later you'd come storming up here to nag or otherwise chastise me."

"So you knew I was taking this particular AeroBlimp to Central America?"

"I'm a first-rate detective, remember?" His broad metallic chest boomed a little when he patted it. "Although my A-1 Detective Agency has only been on the scene for a scant six months, business is growing by leaps and—"

"Forget about your dippy gumshoe operation for a minute." Maggie, somewhat reluctantly, sat down in the seat next to the big overcoated robot. "Just tell me why the heck you're tagging along after me." She dealt him a stiff poke in the side, then winced and flexed her fingers a few times.

"*My* business," Ben assured her, "has nothing to do with *our* advertising agency, Maggie. I'm bound for the turbulent Central America nation of Noventa to carry out an assignment for my detective agency. The fact that you and I and your current paramour find ourselves on the same southward-bound dirigible has—"

"Dante Bodeen is *not* my paramour or anything like that, Ben, and the Quincade & Quincade agency isn't exactly ours," she interrupted. "Since you actually are a robot, who, due to a series of extremely unfortunate accidents and screwups, happen to have a chip copy of my erstwhile husband's nitwit brain in your coco, you're not actually Ben Quincade and therefore—"

"And to think that we were once, in happier times, one of the most idyllic of couples." He gave a mechanical sigh.

"*We* were never any kind of couple. The human Ben Quincade and I, alas, were," Maggie informed him. "You are merely a rattling collection of electronic stuff and . . . but let's get back to the point. Where exactly in Noventa are you going, Ben?"

"Where this AeroBlimp is bound—to the still charming capital city of Beleza."

Her left eye narrowed and, gingerly, she tapped his nearest arm. "What hotel are you staying at?"

"The best, of course," the bot replied. "The famed Hotel Ritz-Sombra."

"I'm stopping there, too," she said in a rueful voice.

"I know, Mag. So is Bodeen, in a suite conveniently close to yours."

"Listen, nitwit, how many times do I . . . No, nope. You're not going to sidetrack me," Maggie decided. "Tell me what sort of case brings you to Beleza."

"The A-1 Detective Agency has been hired to locate the missing Trinity Tate, the famed vidrock star who—"

"I know who Trinity Tate is," Maggie cut in. "The National Police of Noventa are searching for her, the US government has sent a unit of the International FBI to hunt for her and Disney-Warner-Murdoch Media has dispatched over two dozen crack mercenaries into that area of uncharted jungle where the poor kid's private dirigible allegedly crashed last week. So who needs you?"

"Nobody has found her yet," he pointed out. "So I'm going to locate Trinity Tate."

Maggie gave a skeptical shake of her head. "You've got Ben's colossal ego."

"I am Ben."

"Who the heck was goofy enough to hire you?"

"The Greater Los Angeles Trinity Tate Fan Club," he replied. "They've been following my career as a private eye and my long string of impressive successes convinced them I was the man for the job."

"Phooey," mentioned Maggie.

Ben produced a chuckling sound. "Since our paths may cross in Noventa, I don't want you to get the deluded notion that I'm interested in your affairs. By affairs, I mean your business activities and not your fooling around with chinless ad man rivals of our agency or local fellows who—"

"Dante's got a perfectly acceptable chin and there's no reason why you and I should cross paths at all. Ben. In fact, I'll make darn sure that we don't."

"Maggie, even though you didn't see fit to inform me, I'm aware that you are journeying south to pitch the Jazzbar Candy account, as is Dante Bodeen's agency," said Ben in a slightly avuncular voice. "As you well know, dear, Azucar Enterprises, who hope to go international with their increasingly popular energy bar, invited Trinity Tate to Beleza to discuss her participation in a series of concerts sponsored by Jazzbar."

"Really, Ben, I wish you'd get out of the habit of spying on me."

"Keeping tabs on the activities of the advertising agency that I co-own and gathering information for the investigation I'm at work on do not constitute spying," he told her. "Do you want to have dinner once we reach Beleza? I have a list of four-star restaurants that I can print out for—"

"No, nope, not at all." She popped free of the seat. "I know we've worked together a couple of times in the past, Ben, but this time I want to land the Jazzbar account strictly on my own." Spinning on her heel, she went striding back to the Biz Class section.

Behind her, she heard the robot chuckling again.

Overcoat tails flapping, the robot went striding across the circular multilevel lobby of the Hotel Ritz-Sombra. His chrome-plated feet made echoing thumps on the mosaic flooring as he headed for a walkway exit.

One of the several holographic banana palms that ringed the vast lobby began sizzling and sputtering. Then it vanished completely.

Ben noticed that the two middle-sized uniformed Federal Police officers who'd been standing shielded by the tree tried, not too convincingly, to give the impression that they hadn't been watching him.

His internal sensing gear, modified by a few touches of his own, had already alerted him to the fact that a pair of state cops had been scrutinizing him, one of them using the eavesdropping equipment he was now hiding behind his broad backside.

Tipping his beret and giving them a broad metallic smile, he called out, "*Bom dia, senhores,*" in flawless Portuguese. In Noventa, as in Brazil, the national language was not Spanish, but Portuguese.

Ben, adjusting his black beret, moved on. Before he reached an exit, Maggie emerged from one of the lobby cafes and beckoned, somewhat anxiously, to him. She was still holding her breakfast plyonapkin in her hand.

He made his way over to her, passing three clean-cut young men in *International FBI* jackets and caps who were having a guarded conversation next to a dolphin-topped holofountain.

"How's our ad-game archrival Dante Bodeen?" he asked when he'd reached Maggie and bowed slightly, and rattlingly, toward her.

"He's been suffering from blimp lag ever since he checked in last night," she answered. "But that isn't why I . . . Hey, why are you smirking?"

"Read up on the basic laws of robotics, Mag. Robots can't smirk."

She asked, frowning up at him, "You don't have some sort of built-in gadget that can give poor Dante a tummy ache, do you?"

"Guardbots come equipped with no such equipment," Ben assured her. "Anything else you wished to chat about?"

Looking away from him, Maggie said, "Well, it's about the way I talked to you on the flight down here yesterday."

"You were upset and, as I well know, when you're upset, your shrewish side tends to rise up and—"

"The point is, Ben I've been thinking."

He nodded approvingly. "A splendid habit, something you should do more often."

Maggie took a deep breath in and out. "Actually, as I've come to realize," she continued, as contritely as she was able, "if you do happen to find Trinity Tate by some fluke, why, that'd help our cause. I mean, it would, you know, impress the Azucar people and make them even more likely to award Quincade & Quincade Advertising the Jazzbar account."

"By gosh," said the silvery robot, "you're right, Maggie. I hadn't thought of that, being preoccupied with my selfish detective activities."

She eyed him for a few silent seconds. "You're a difficult guy to apologize to—in whatever format you happen to be in."

"Basically I'm a kindly fellow." He held out his metallic right hand. "Let's shake on it and then I must be off."

She hesitated, then shook hands. "I'm having my initial meeting with the Jazzbar executives this afternoon. We'll be discussing the sample ads and vidspots we sent down here last week," she informed the bot. "And what are you up to?"

"I can only say," he said as he turned away, "that the game's afoot, Maggins."

"Don't call me that, darn it."

Tipping his beret; he headed again for an exit from the hotel.

Just coming into the lobby were two reporters from the Newz Vidwall service accompanied by their robot cameraman. The young woman reporter recognized him.

"It's the mechanical sleuth," she said, stopping. "Is the A-1 Detective Agency going to hunt for the missing Trinity Tate?"

"Nope, ma'am," he answered. "I'm down here to run in the big Beleza Marathon on Friday."

"Robots can't enter that," she said.

"I got a special dispensation from the Bishop of Beleza." Smiling, he went outside to hail a ballooncab.

The security bot, an inexpensive model who guarded this particular entrance to the vast underground Mercado Grande mall complex, said to Ben, "Well, *senhor*, if you aren't carrying a concealed weapon, why then did my internal metal detector produce a tell tale *bing-gading* when you passed by me?"

"It's because I happen to be made of metal," he explained. "Like you, amigo, I am a robot."

"Ah, I see," said the secbot. "I'm glad, *senhor*, that you pointed out that fact to me. Let me scan my internal mall rule book to determine if we allow robots to frequent the many distinctive shops and restaurants to be found within the famous Mercado Grande. Shouldn't take more than five *momentos*."

"Why the increased security all over town?"

"The Beleza Marathon," answered the tinplated bot. "Many noted business and political figures will be among the 15,000 participants. Our current benevolent dictator is a running buff, known to do a mile in 6.5 *minutos*, and he encourages his minions and sympathizers to be as fit as he."

"And the government fears rebels will slip into town to stage some sort of incident during the run?"

"*Sim, senhor*, exactly," the secbot answered. "Forgive the delay, but the rules pertaining to admittance of machines and mechanical beings are complex and somewhat obtuse."

"I believe I can clear this up for you." Ben touched a spot just below his plaz left eye with a big silvery finger. "Just look here for a moment." The eye commenced glowing red.

"I . . . I'm . . ." muttered the secbot, stiffening to a position of attention. "What is it you wish, master?"

"You'll let me in now and out later. You'll also forget we ever met. Got it?"

"To hear is to obey."

As he entered the mall, Ben said, "At ease."

For some reason, the designers of the shopping complex had given it a nineteenth century British Victorian look. The pedramps were bordered with imitation wrought-iron railings, huge floating lamps of plaz Tiffany glass were all about, and the floorwalkers, male and female, were dressed like London bobbies.

Ben rode up to the third level on a moving ramp, passing the familiar Colonel Buffaloburger restaurant, the Mickey Mouse Cocktail Lounge, the Genetically Engineered Donut Hut and the Harpoon Saloon, with its *We've Served 20,640 Mickey Finns* litesign.

Trotting along the third tier passway, he spotted his goal between a Souvenir Undies shop and a Useless Gadgets outlet.

The shop Ben sought was built to resemble a cozy thatched cottage. Above its doorway a *faux* hand-painted sign announced *Old Stuff, Inc—Your Best Source of Fake Nostalgia!* Attached to the sinoak door was a small neobrass plate stating *Mrs. Molesworth, Proprietor*.

Crossing the small cluttered shop, he passed a large floating display table that told him, "Last chance, *senhor*! All fake *Star Wars* ephemera going for half—yes, I said half—price. Hurry! Sale ends soon."

Ben skirted an authentic-looking twentieth century magazine rack filled with imitation 1930s American comic books. He halted at a door marked *Proprietor* and knocked on it with his metal right hand.

"No need asking who the hell that would be," came a somewhat raspy female voice. "C'mon in, kiddo."

Mrs. Molesworth seemed to be a plump woman in her late fifties. She had a good deal of frizzy platinum blonde hair and was wearing a flower-pattern bizsuit and smoking a kelp stogie.

"What have you found out for me?" asked the robot, perching on a high stool that faced the heavyset woman's electric rocking chair.

"Not so fast, Benjie," said Mrs. Molesworth. "I'd like your opinion, as one mechanical person to another. Do I look sufficiently believable?"

"Even the *real* Mrs. Molesworth up in Greater Los Angeles isn't all that believable," he replied. "The hair doesn't look real, but then—"

"If you didn't know I was an android replica of myself, would you tumble?"

He eyed her for about a half minute. "You're very creditable," he decided. "The cigar is a nice touch as well as the sagging chins, the purplish bags under the eyes, the tracing of busted veins on the squashed nose. All of those little details combine to make you a convincing Mrs. Molesworth."

She nodded, exhaling smoke in a believable manner. "This is my fifth Old Stuff, Inc shop outside of the States and my fourth andy dupe," she said. "These Noventans are goofy for American junk. I've sold twenty-five Buck Rogers Zap Guns in the past month, at 100 *escudos* each. They also go for—"

"I'm more interested in your sideline of selling information," he cut in to remind her. "What have you dug up about Trinity Tate?"

"A thousand bucks American."

"High."

The andy shrugged. "I got something good for you, Ben," she told him. "Something the federal cops, the International FBI and all the other gumshoes and media stooges don't have. Now that I think about it, it's probably worth more than a thousand."

"I'm putting a thousand dollars in your Bahamas Banx account." From the left side of his broad silvery chest came a brief whirring. "It's there. Okay, what have you got?"

When the Mrs. Molesworth simulacrum touched the control panel on the arm of her chair, it ceased rocking. Leaning forward, she asked, "You know where the town of São Orlando is?"

"Fifty miles, roughly, north of here."

"What you want to do, Benjie, is get, soon as you can, honey, to the São Orlando City Hospital," the android informant continued. "Get in to see a patient named José Chupeta. The guy's a small-time smuggler who spends a hell of a lot of time in and around the stretch of wild jungle where Trinity Tate's blimp crashed."

"He saw something?"

"That he did. He wishes to sell what he knows," she explained. "But he's leery of the official law and the press. So you, my boy, are an ideal customer."

Ben asked, "Why's he in the hospital?"

"José has an unfortunate tendency to get the crap beaten out of him."

"By the people he spies on?"

"Might be, but I think this time it was an irate husband," answered the platinum-haired android. "I'm pretty certain that I'm the only one thus far who knows about José Chupeta. But maybe somebody else does—so you may run into trouble."

Standing, the robot said, "Even so, I'll go pay him a visit."

The android nurse on the third level of the São Orlando City Hospital passed Ben's fraudulent Medix card through the ident slot in her left wrist. "Bing bing," she said, then shrugged, causing her crisp off-white uniform to make faint crackling sounds. "Your ID passes muster." Her fog-gray plaz eyes gazed up at him from behind the off-white boomerang-shaped reception desk. "In my opinion, off-white is the best color for medbots, rather than your shiny—"

"Chrome is all the rage in the States," the robot assured her. "And wait'll you see the new spring colors."

Returning his spurious plazcard, the reception nurse told him, "You'll find Patient Chupeta in room *trinta e tres.*"

Ben turned away and headed for room thirty-three.

Stationed between the doors of thirty-two and thirty-three was a tall, thickset woman in the candy-striped uniform of a volunteer worker. "Were you contemplating visiting Patient Chupeta?" she inquired.

When the robot nodded, his metallic neck produced a slightly shrill creaking. "I was indeed, ma'am."

"The touring puppeteer is in there cheering him up now and if you'll wait out here, it—"

"You need more practice with makeup." Ben touched the volunteer's upper arm with his left forefinger. "Your beard stubble is showing through."

"Sir, I find your remarks—oof!"

The disguised thug stiffened, stunned by Ben's built in stungun, slid down the off-white wall, and settled spread-legged on the off-white floor.

Ben moved to the door of room thirty-three and, gently, booted it open.

Bent over the floating bed was a plump middle-age man. He had a Punch hand puppet on his left hand and a Judy on his right. Using mostly the Punch hand, he was in the act of attempting to strangle the dark, thin, and much bruised and battered, patient occupying the bed.

Clomping over to him, the robot again used his stungun finger. The puppeteer/assassin stiffened. Judy came up and slapped at his temple. Groaning once, he started to fall, felled-tree style, toward the floor.

Catching the unconscious man, Ben laid him down on a thermal throw rug.

"*Muito obrigado,*" said Chupeta in a faint, dry voice. "I owe you my life, *Senhor Máquina.*"

The bed sank a foot closer to the floor as Ben sat on its edge. "Since you're in a deeply grateful mood, Chupeta, I'd like you to do me a small favor in return."

"Anything, *senhor*, for you have—"

"Okay, what do you know about Trinity Tate?"

"Nothing, not a thing. Never heard of her and I detest vidrock music," the patient insisted. "I'm a fan of Neo Bebop myself."

Ben tapped his right little finger with his left forefinger. It made a clinking sound. "Among the many attributes I've added to my basic Guardbot allotment, *Senhor* Chupeta, is a delivery system for a foolproof truth serum." He paused. "So you can sell me what you know, or I can use this stuff on you."

A resigned sigh drifted up from the much-bandaged man's narrow chest. "That bastard with the tacky puppets wanted me *not* to talk."

"Forget him, and Punch and Judy. Tell me about Trinity," Ben invited. "I'll pay two thousand *escudos.*"

"Three thousand."

"Twenty-five hundred, no more."

"Very well," agreed the battered patient.

He was finishing his narrative when the door to the room, very rapidly, disintegrated.

* * *

Standing up at his place at the head of the rectangular plexiwood conference table, the CEO of Azucar Enterprises announced, "We are very enthusiastic about your agency's presentation, *Senhora* Quincade," he announced, dropping his pants.

"Whoa now, *Senhor* Kazaro," warned Maggie, who was sitting at his left. "Making a play for me isn't—"

"He merely wants to show you his shorts," explained the Jazzbar Advertising Manager from the other side of the table.

"Even so, I . . . oh."

Manel Kazaro was wearing a turquoise and orange pair of plyospan running shorts. "*Sim, senhora*, I merely wished to demonstrate that I, too, am a runner," he said, smiling broadly. "Another reason why I am impressed with the Quincade & Quincade sample Jazzbar vidwall commercials you've just showed us."

"He intends to run in the Beleza Marathon this Friday," added the ad manager.

"I shan't win, since I can only achieve a seven minute mile thus far," said Kazaro, kicking his fallen trousers aside with a running-shoed foot. Gazing over at the huge blank vidwall screen where Maggie's demo spots had recently appeared, he smiled widely again. "Your proposed slogan is *muito bom*, meaning very good. Yes, 'For Pep When Needed . . . Just Eat It!' And the sequence where the runner takes just one bite of his Jazzbar and then flashes ahead of all the others to win. Ah."

"What would you say, Mrs. Quincade, to having our Jazzbar logo on the back as well as the front of the runner's jersey?" inquired the advertising man.

"*Muito bom*," she replied.

Kazaro dropped to the thermocarpet to begin a round of pushups. "We would also like to see some palmnet commercials about our state-of-the-art production plant here in Beleza. Our Jazzbar facility was voted the most hygienic in all of Central America."

"Spotless," amplified the adman.

Maggie nodded. "We can do that, sure," she said, affecting an amiable smile. "I sure know that when I toured your Jazzbar factory this morning, I was really impressed."

"I hope you also enjoyed the Jazzbar samples." Kazaro was back in his chair.

"I especially liked the Almost Peanut Flavor bar," she answered, redoing the smile. "But, of course, all three kinds are delicious."

The CEO said, "I trust they also filled you with extra energy?"

"You bet. For an hour after I finished them I could hardly sit still."

"*Muito bom*," Kazaro said.

A handsome, though short, man appeared on the floor-to-ceiling vidwall screen. "It's time again for two minutes of all the latest news in your choice of language," he said in English. "Brought to you by the democratic government of Noventa." He was sitting, legs crossed, on an inflated rubberoid Morris chair in front of an off-white wall. His two-piece bizsuit was lemon yellow. "But first, this word from our sponsor."

The newscaster's image was replaced by that of a taller, thinner man. He was perched on a high stool with a very large stuffed parrot roosting on his left knee. "Well, José, do you know what time it is?" he asked the bright colored, mostly green, dummy.

"*Sim*, it's news time," answered the parrot. "Every hour on the hour, around the clock, the democratic government of Noventa brings its citizens two complete minutes of the latest news, complete and uncensored."

"Right you are, José. Our concise summaries provide all the news that's fit to see and hear. Plus what else?"

José's beak clacked and he eyed the ventriloquist. "Can you give me a hint?"

"The truth. And nothing but."

"Of course, the truth. How could I

have forgotten?"

"And now here's the award-winning Seraphim Lemos with the latest news update."

The short handsome man reappeared. "Federal Police announced only moments ago that they are very close to locating the missing famous vidrock star, Trinity Tate. They further say that the help of the International FBI has been invaluable. From our science news desk today comes this announcement that an independent scientific laboratory has found the new Jazzbar to provide 22 percent more energy than—"

"Someone at the door," announced a ceiling voxbox.

"Who?" asked Maggie, straightening in her hiphugger floating chair.

"An unconscious robot, ma'am."

"Holy heck." Maggie turned off the vidwall and went running to the door. "Open it, huh?"

"Are you certain you want a defunct mechanical man cluttering up your—"

"Open the darn door!"

When the suite door slid aside with a whispery whoosh, the robot body of Ben fell backwards into the room, battered face upward.

"Good gravy, they've murdered him." Maggie crouched and thrust her hands into his silvery armpits. Grunting, huffing, she dragged him in out of the hotel corridor.

The top of his chrome-plated skull was sitting lopsided, missing many of its screws. Scrawled across Ben's broad metallic chest in neat orange glopen capitals were the words *HE KNEW TOO MUCH*.

Once she had the body dragged safely into her living room, Maggie said, "Okay, shut the darn door."

The door hissed shut.

Gently, she touched the top of the robot's dented head. It rattled twice, then popped open. "My gosh, it looks like they swiped his brain chip."

At that moment Ben's left eye gave a clicking wink. In a just audible voice he assured her, "Don't worry, Mag, I've got a spare."

The afternoon sky over the dense jungle turned, swiftly, an ominous deep, thick gray. A strong wind rose, buffeting the rented skycar and starting the tallest palm trees below them to sway violently. Huge rumbles of thunder commenced far on their left.

"Oh, great," observed Maggie, who was sitting tensely in the passenger seat. "Now we also have to fight our way through an almighty storm on this fool's errand of yours."

"Not a fool's errand, Mag," Ben assured her. "And if you really believe it is, why did you insist on tagging along?"

"Because, dopey, Quincade & Quincade is on the verge of landing the Jazzbar account," she told the robot. "And if . . . wow!"

Heavy rain came hitting at their small skycar, producing loud drumming sounds on its plazmetal surface. The flying vehicle swayed, bounced.

At the controls the bot said, "You were saying, Maggins?"

"Ouch." Forgetting herself, she'd given him a poke in the arm. She blew on her injured fingers, frowning. "If the Azucar people have sweat shop factories out in the jungle, well, that would sure affect the approach I'll take to selling Jazzbars to the American public."

"How about a slogan like 'Made by children for children?'"

"You still haven't convinced me that this alleged sweat shop uses child labor," Maggie said. "Besides, this is an energy bar for grownup—"

"Slave child labor."

"I find that tough to—"

"The point, Mag, is that your chums at Azucar, in addition to their spotless state-of-the-art plant in Beleza, also operate three huge sweat shops out in the jungle. That's where most of the Jazzbars are turned out, as well as their Chocoholic Peanut Cups and their Instant Coffee Jag Bars."

"Okay, I know you think this is an ethical thing, Ben, but a successful ad agency can't always—"

"What I think it is," the robot interrupted, "is a kidnapping. What I was hired to do is bring Trinity Tate back to Greater LA—alive and minimally damaged."

Hugging herself, Maggie watched the heavy rain slamming at their windshield. "All you have is the word of a hospitalized ne'er-do-well."

"A ne'er-do-well who was kidnapped from his hospital bed to keep him from telling anybody else what he saw in the jungle," he reminded. "By a group of louts who used a disabler on me and swiped my brain chip, so I couldn't pass along what I'd learned from Chupeta."

"By the way, Ben, you still haven't explained how you came to have *two* brain chips."

"To avoid being brainless," he answered. "I created the dupe some months ago and stored it elsewhere on my person."

"Well, if you carry a spare—and don't bother to tell me where it's stored—why didn't you go into action immediately and stop those guys?"

"Unfortunately, the switch-over takes several minutes," he explained. "By that time, some of them had carried off Chupeta, leaving two goons behind to deliver me to you as a warning."

"You could've stopped them from dumping you on my doorstep and scaring the daylights out of me."

"Initially I wasn't sure what they had in mind for my remains. So I decided I'd learn more by playing possum for a spell."

"A big, bulky chrome-plated possum," she said, annoyed. "When I saw you sprawled there in the hotel corridor, I—"

"Proving you still love me."

"Heck no, I was trying to figure out how I was going to dispose of a huge defunct robot."

Ben consulted the dash panel. "We're nearly to the sweat shop in question," he told her. "I'm landing about a mile from the place."

"We're going to walk a mile through this deluge?"

"It's a subtler way of sneaking up on our destination."

Maggie said, "I still don't believe that Trinity Tate was kidnapped by roving slavers and sold to a backwoods candy factory."

"Another reason for this trip," said the robot, "is to convince you."

The fat, heavy raindrops came down at Maggie and the robot, slamming down through the fronds and vines.

"If you knew we were going to be trekking through a tropical deluge," complained a severely damp Maggie, "you might have suggested I bring a rainshield."

"Hush," he advised, "we're almost at our rendezvous spot." The heavy rain produced a continuous tin-roof noise as it pelted him.

"Who the heck are we rendezvousing with?" inquired Maggie as she sloshed along the muddy trail.

"I contacted some people who are familiar with the territory."

"What sort of people exactly?"

"Rebels."

Maggie came to a splashing stop. "Rebels are all violently anti-American," she told him. "They'll kill us."

"Trouble with a lot of advertising people is they tend to believe other people's advertising and propaganda." He moved on.

Reluctantly, Maggie followed. Outside of a few soggy mutterings, she uttered nothing for several minutes. Then she asked, "If you know about Trinity's being kidnapped by slavers and sold to a Jazzbar factory, how come Kazaro and the rest of the Azucar board don't?"

"They do."

She halted again. "C'mon, Kazaro *hired* her. She won't do him any good as a slave laborer in one of his candy factories."

Ben took hold of her arm. "Let's keep moving," he suggested. "We want to get there before the raid's over."

"What raid?" She allowed him to urge her into motion.

"After I chatted with a few of the rebel leaders from this area, they decided to move up the date of their planned raid on this particular Azucar establishment."

"And now explain why the dickens Kazaro hasn't rescued Trinity himself."

"Azucar can't go global with the Jazzbar if the word gets out that most of their stuff is really turned out in rundown factories by mostly underage slave employees. It would take one hell of a positive PR campaign to overcome that."

"So?"

"They're going to hold Trinity here until her thinking is modified."

"They plan to bribe her to keep quiet?"

The robot's shiny, rain-spattered head creaked when he gave a negative shake. "Nope, they're waiting for a mindwipe expert to arrive from Argentina."

"You sure aren't painting a very nice picture of our prospective client."

"Are you still thinking of taking on the Jazzbar account, Mag?"

Maggie shrugged, scattering rain from her slim shoulders. "I might be able to persuade them to close some of the sweatshops and—"

"Halt." Ben swung out a metal arm to impede her progress.

"*Senhor* Quincade, welcome," said a voice from among the rainswept trees.

"*Senhor* Enos," said the robot.

A lean young man wearing a plaz poncho stepped onto the mucky trail. "And the *senhora* is your celebrated *esposa*."

"Former *esposa*," corrected Maggie.

"The raid's begun?" asked Ben.

"*Sim*, and all is going very well," Enos assured him. "If you'll follow me, we'll get going on your part in the operation."

"What's your part?" asked Maggie.

"Patience," advised the robot.

* * *

The factory sat in a weedy clearing, a weather-beaten two-story building, unmarked. To the right was a freshly-topped landing area for skycars, skyvans and cargo balloons. Sprawled at the field's edge, hard rain splattering him, was a fat man in a two-piece guardsuit. He'd been stungunned.

A wide neowood door at the front of the sweat shop hung open, dangling on one twisted plaz hinge. Hurrying out of the place, most of them thin, hollow-eyed young women and girls in faded one-piece workdresses, were the freed workers. They were escorted by the rebels who'd rescued them. Other rebels were herding captured Azucar foremen and overseers.

"Kids," said Maggie, who'd stopped at the edge of the clearing. "Most of them are just kids."

"You'll have to gloss over that in your Jazzbar commercials," said the robot.

"Oh, heck, Ben," she said, "you know darn well I'm not going to touch the account now."

"Moral lessons at no extra charge."

"Don't be so . . . what's the matter?"

"The plan was for them to turn Trinity over to me, but my sensors tell me she's still stuck in there." After touching her shoulder, he started running toward the factory.

Inside, the robot went stomping up the inoperative pedramp that led to the upper level of the big barnlike factory. A packaging machine lay on its side and several small fires were crackling to life amidst the other machinery on the first level.

The black smell of smoke mixed with the strong odors of melted chocolate and spilled artificial sweeteners.

"A fine bunch of toadies," an angry young woman's voice came spilling out of an open-doored second level office pod.

Ben entered the room. Strapped to a white operating table was a slim blonde girl of about seventeen. She was wearing a short, dirt-smeared hospital gown.

"I'll have you free in—"

"Who in the bloody hell are you, bozo?"

"I was hired to rescue you, Miss Tate."

"Well, you took your frigging time doing it," complained the slender singer while he unfastened the neoleather straps holding her down. "Who hired you?"

"The Greater Los Angeles Trinity Tate Fan Club." Gently, the bot scooped her off the table and set her on her feet.

"Those nitwits," she observed, swaying some and putting her palm against his broad metal chest to maintain her balance. "What did my frapping agents do?"

"Alerted the International FBI. Can you walk?"

"Sure, but what's the hurry? I'm all pins and needles below the knees."

"The factory's on fire," Ben mentioned.

"Oh, that's right," said Trinity, grimacing. "That's probably why my people all ran out and left me behind. A bunch of twerps. Soon as I get back to GLA—*bam!*—they're all out on the pavement."

"I'll carry you out of here." He picked the young singer up.

"These candy-making louts were going to try a mindwipe on me," she told him. "So I wouldn't spill the beans about their turning out this crap in sweat shops. Mindwiping Trinity Tate—some balls, huh?"

"An audacious scheme, yeah."

"Bad enough being in a stupid balloon crash, but then I'm kidnapped, along with my whole disloyal entourage, and sold into slavery by a bunch of unkempt bandits," complained the young woman as they descended through the thickening smoke. "Then instead of rescuing me, those Azucar bastards decide to send for a mindwipe expert to make me forget all about this. Wait'll I get to some press people, am I going to blab."

They reached the ground level and the robot carried her toward the door.

"A good idea."

"By the way, who are you?"

"Ben Quincade."

"Yeah, I've been told about you, Ben. An advertising wiz *and* a private eye to boot."

"That's me, yep." He carried her out of the ruined, smoky factory into the rainy twilight.

Some members of her entourage had lingered and they came sloshing up to her now.

Trinity said, "You clunks are all fired."

When the robot came tromping into Maggie's private ad agency office at midday, she was perched on the edge of her aluminum desk watching a newscast on her vidwall screen.

On the wall, looking somewhat google-eyed and wearing his racing togs, *Senhor* Kazaro was explaining to a circle of American media people that he was shutting down all of Azucar's sweat shop factories and seeing to it that all slave employees were being compensated handsomely and set free. Kazaro was throwing himself on the mercy of the courts.

"He's confessed to running sweat shops, using underage slave labor, the whole kit and caboodle," Maggie explained. "The news people stopped him as he was about to start running in that dippy marathon to ask him about Trinity's charges. Instead of stonewalling, he admitted everything and more."

Ben settled into a plazchair, wide metal back turned toward the immense screen. "Fancy that."

After telling the news to turn off, Maggie eyed him, her head tilted slightly to the right. "You knew about this," she accused. "In fact, you had something to do with this."

His chest went *pong* when he poked it with his thumb. "I'm responsible for Kazaro's change of heart," he admitted, smiling. "Using my built-in, and personally modified, mind control gear, I instructed him to tell all when questioned—and also to initiate drastic reforms at once."

"That's why you didn't flee the country with me and Trinity and her gang."

"When I work on a case, Mag, I tie up all the loose ends. I went back to the capital, chatted with Kazaro, caught a later blimp home," he said. "Sorry there's no more Jazzbar account for you to—"

"Hey, I bowed out of that last night." She hopped free of the desk, sat in a hiphugger chair. "Despite what you may think, I do have a conscience. Even if it means losing untold millions of dollars and—"

"Obviously, which didn't happen during our wedded years, I'm having a positive influence on you."

Her nose wrinkled. "In this one instance."

"I received a communication from Trinity Tate early this morning," the robot informed her. "She's parted with most of her staff and feels, especially in the light of my heroic efforts in Noventa, that Q&Q is the outfit to handle all of her publicity."

Maggie smiled. "That's great, Ben. How much in billing?"

"At the moment only $5,000,000 a year," said the bot. "Nowhere near what the Jazzbar account would've paid."

Maggie sighed. "Well, if I'm going to have a conscience," she said, "I guess I have to expect to suffer a financial loss now and then." ■

(EDITOR'S NOTE: Ben and Maggie appeared earlier in "I Married a Robot" [November 1999], "My Favorite Robot" [May 2001], and "The Robot Who Came to Dinner" [July/August 2002].)

Your politicians are only as good as their advisors.

—George Sirk

Ten persons who speak make more noise than ten thousand who are silent.

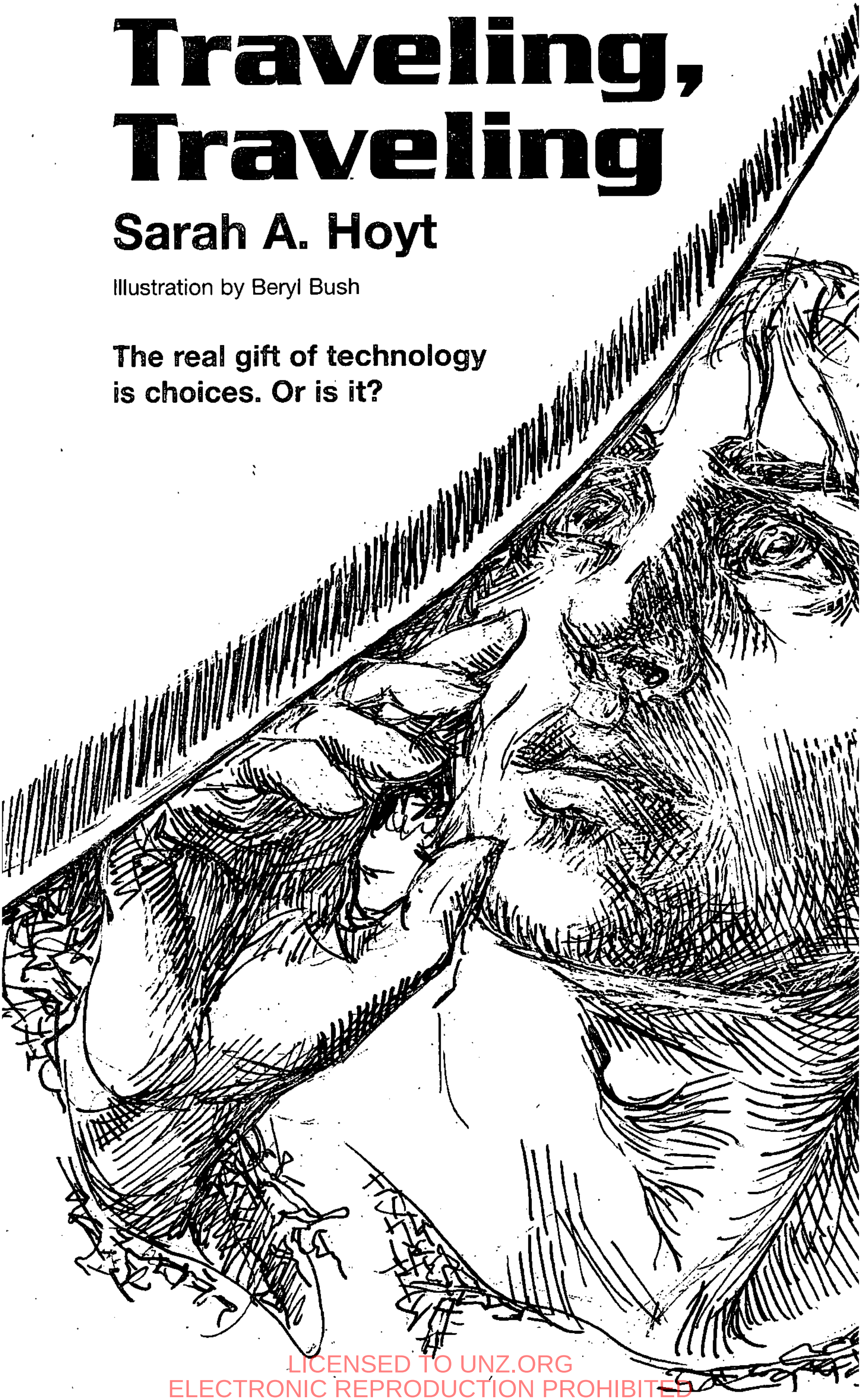
—Napoleon Bonaparte

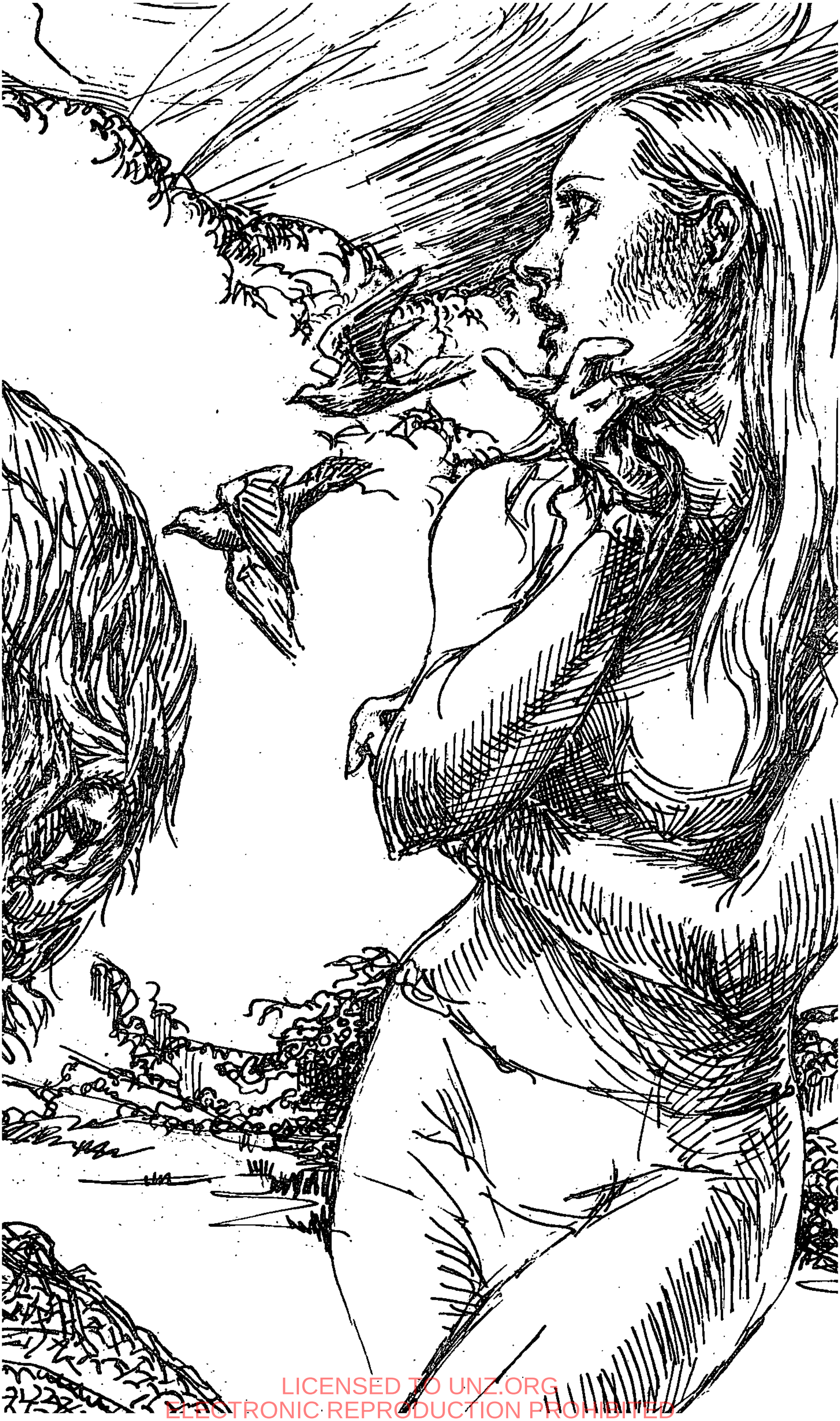
Traveling, Traveling

Sarah A. Hoyt

Illustration by Beryl Bush

The real gift of technology is choices. Or is it?





The boys squatted in a circle in the middle of the dusty, unpaved road. There were six or seven of them, all at that age when the body grows too fast for the controlling mind and straggly hair appears on still-baby-soft faces. Their dirty-blond hair, pale blue eyes and hulking bodies revealed a genetic uniformity that startled, in the middle of the twenty-second century, with the world getting smaller and smaller by the minute.

Around them, their village slumbered in the midday heat. Somewhere, in the surrounding hills, a cricket chirped noisily breaking the still, glassy silence.

They turned from whatever had been holding their attention to stare at me, as I walked up to them.

They would turn and they would gawk, pale eyebrows rising beneath the lank wheat colored hair.

I was a woman alone, a stranger, traveling on foot. They undoubtedly had seen flyers zip by overhead, but strangers on foot were a different thing. Or at least they would be, here, where the mountains echoed only stillness, the roads were unpaved and rough amid scraggly grass and there were no shops, no museums, no restaurants in sight.

Also, they all looked like they wore homespun, while my suit was a shiny, metallic silver—pants and jacket threaded through with bio fibers, to whisk away perspiration and mold the body.

The latest fashion from London to Canberra.

They stared, and stood up, and moved apart a little. The tallest one of them slipped something into the back pocket of his frayed black pants. It looked like a magnifying glass that I'd seen in a museum, once.

That was when I noticed, on the yellow sandy road, in front of them, a palm-sized beetle, curled, its tiny feet turned in. Burned.

The eldest boy pulled the magnifying glass out of his pocket, shoved it back again, then pulled it out.

I felt my stomach turn, though I couldn't say why. After over a hundred years of life, the mindless cruelties of early adolescence should not affect me.

But you'd think with all the holos oriented to non-violence, all the sensies preaching loving kindness to all the peoples of the world and every creature under the sun, people would be past this.

The taller boy fixed me with his slow, puzzled stare. "What do you want?"

If I'd been a bug he'd have fried me too. "My name is Traeena Schnell," I said. "I was on my way to an important conference in Paris, when the grid went down." I gestured behind me. "My flyer is back there. I need a link."

The boy's brows knit. His boiled-gooseberry eyes took me in, from straight, platinum-blonde hair—my latest melanin change—to the curves—thank heavens for rejuv—displayed through the clingy suit.

His gaze had an almost physical presence. I felt myself blush.

"There are no links," he said. "In the village."

I sighed. Everyone had links. Everyone. Even religious fanatics and tribalist African sects.

Without a link, if you should have a medical emergency, you couldn't call for rescue. Without a link you wouldn't know of emergencies or disasters. Without a link, you might as well be living in the twentieth century, with all its isolationism. Without a link, you were screwed.

"Of course you have a link," I said. "You just might not be allowed to use it. Take me to your father." My voice echoed, harsh, across the still hilltops.

The cricket stopped chirping.

The boy sighed, with superior fatigue. "All right," he said. "But my father don't have no link either."

He turned, nonetheless, and led the way up the narrow street, past a couple of dogs dozing in the sun, and into a back-yard gate to a small, whitewashed house.

The way to deal with petty pre-teen tyrants had always been intimidation. I remembered that much, whatever else I'd forgotten.

Minutes before I walked into the village, I'd been in my flyer, which was set up as a tiny business office.

My desk had been pulled out, the chair up to it, my fingers flying on the keyboard, while the hologram screen writhed and twisted in front of me, the symbols changing, the agenda for the meeting taking shape ahead of me.

I worked—had worked for years—for GuideNet, the principal of many national nets that kept the flyers in the air and guided them with microwaves along pre-programmed paths. It had taken over in the twenty-first century, when the first flying cars had proven a nightmare of traffic control and well beyond the coordination of most mortals.

So the microwaves drove my flyer, while I worked on the program for a meeting that would change GuideNet and the world forever.

And then the power went out, the failsafes of my flyer activated, and I was falling, falling gently like a leaf, onto a landscape of rolling green hills, with no civilization but a few stone buildings in sight.

I knew what had happened then, of course. This wasn't the first time.

The local GuideNet relay had got bombed by some nationalist group or another. And now I'd have a sweaty walk to the next link, to inform them of the problem.

Damn, I hated terrorists.

The tall boy opened a metal gate, taller than both of us and painted green, but slowly losing its fight to rust.

I hadn't seen a metal gate in ages. Most of them had been replaced by cheap dimatough or ceramite, which neither rusted nor needed painting.

On the other side of the gate, the bucolic look continued, an exhibition of anachronisms in everyday use. An oxcart, such as I'd seen only in pictures, sat in the middle of a yard paved in broad stones. No oxen were coupled to it, but straw piled high in the back.

A young man looking like an older, pimply version of my guide, had been unloading the straw with a pitchfork. When he saw us, he stopped, and stared, slowly wiping the sweat from his forehead to his tattered homespun sleeve.

A dog tied to a garden stake barked at me, pulling on his leash.

He stared at me, and blushed, then glared at the tall boy. "Gerald?" he asked.

The tall boy sulked. "She wants to see father. She wants to use our link."

The older youth frowned, earnest bewilderment in his pale blue eyes. "But—" he said.

We didn't stick around to hear his objection. Gerald—or at least I assumed this was Gerald—led me away from the yard, and across a narrow, vine-covered passage, past slipshod-looking wooden chicken coops, to the back door of a house.

The back door was open to a broad kitchen which, like the patio outside, was flagged in broad stones.

The kitchen had a table, a stove, and a tall refrigerator that hummed noisily. At one of six chairs around the table, a man sat. He was reading—I had to blink to believe it—a paper book with moldering leather covers. A cat dozed in his lap.

It transported me to my earliest memories, at the end of the twentieth century—my grandmother's farm kitchen, the door standing open to the vineyard and the flagged threshing yard. Chickens and dogs and cats.

But the man set his book down and looked at me, hands crossed on lap. He looked spare and lean and dry, like a saint carved, long ago, in wood that had since lain in a cold, dry place. His features had the sheen of long-dried wood, impenetrable and hard as rock. His fine white hair stood on end and with his whiskers, it surrounded his face like a nimbus.

"She wants to use our link," Gerald said.

His father nodded once, gravely, then stared at me, and asked, as if his son hadn't spoken, "What do you want?"

"My flyer went down," I said. "About a mile away. The net went down. If I may use your link, I can ask for a pick up."

He blinked. In the spare coldness of his face, every movement was exaggerated, so that something as simple as blinking his eyelids became as pronounced, as meaningful, as another man's broad wave. At length, the too-straight lips, in the narrow face, moved. "We have no link," he said. And, having spoken, looked back at his book.

I had been dismissed.

"Of course you have a link," I said. "Of course you have a link. Everyone has a link. How would you deal with a medical emergency, for instance, without one?"

He didn't raise his eyes from the book. He did not acknowledge my presence. Behind me, in the kitchen, flies swarmed and buzzed.

The dog barked outside in the yard.

I walked back out to the yard, where the older boy continued loading straw, in a desultory fashion.

He paused in his work, and stared after me, as I walked out the rusty gate, into the hot midday street.

Walking down it, I couldn't help thinking that people watched me from behind the closed curtains of their silent houses. Houses closed like that were like half shut eyes, with an intelligence lurking behind.

Friendly or unfriendly? I couldn't tell.

Was this community truly as isolationist as it seemed to be? Would there be links in the other houses?

The silence of the hills reflected back at me, vacant, silent, as it had been for centuries.

It made the possibility of links, the possibility of anything as vital as current civilization, a distant possibility.

I passed a small cemetery, marked with half-fallen tombstones, slumbering as firmly under a canopy of trees as the living hid in their silent houses.

As for me, and my desire to return to the crowded, busy modern world, I'd have to do it on my own.

I was halfway to my fly car, on my sore feet, amid the silent hills, when the taller boy caught up with me.

"Lady," he said. "Lady."

I turned back and saw him approach, long legs working over the uneven terrain with the assurance and practice of a mountain goat.

"We really do not have a link," he said, as he followed me.

If he really didn't have a link, why was he following me? I nodded at him, but turned my back and walked away.

My fly glimmered in the distance, like a metallic egg, laid by a gigantic, mutated bird amid this bucolic landscape. I felt hot. My suit was supposed to adjust to temperature and keep me cool or warm no matter what.

But something about this unfiltered air, this strange place, must be interfering with the controls, because I felt hot, sweaty and prickly.

The steps behind me didn't slow down. The youth caught up with me. "It's only that—" he stopped, and swallowed, making his prominent Adam's apple bob, while he ran to keep up with me. "It's just that I can't have you thinking that . . . I mean, my grandfather and a friend of his founded this village. Or perhaps I should say, returned to it, and they decided they would live as in the late twentieth century, because . . . well, they thought things were getting too fast for them. But—you must understand, we aren't being inhospitable, or anything, it's just that we don't have a link, or any of the conveniences of modern—well, of your type of life."

I nodded. "You don't need to explain," I said, coldly. "Retro communities are nothing new. There are communities that live as anything from the seventeenth century onwards." And all, but a few maintained for show, with the comforts of modernity available behind the scenes. And the real ones, the domain of zanies and crazies, often led by charismatic, insane leaders. But I couldn't tell this to the young man, since the leader was likely his father. He smelled faintly of sweat, a smell I almost didn't remember in this time of temperature-controlling suits and super-deodorizers.

His feet hopped and skipped over the uneven ground, as he kept up with me.

"You can tell me how to get to the next village," I said. "One that might have a link."

He swallowed. "It's miles and miles away," he said. "And we don't have cars. We don't have cars because father—because it has been agreed it would make the possibility of contamination from the outside too great."

"Oh," I said. "Then you may go. You've told me you're not inhospitable. What else can you do? You may go back." We were now steps from my flyer. It would be stultifying inside, without the air conditioning functioning and with all systems at minimal, power-saving levels.

But there was nothing for it. I might as well sit beside the fly and wait for it to come to life.

Unfortunately, if only the net in this part of the world had gone down, unpopulated and rural as it looked, it could be days before the controllers noticed the failure and corrected it.

"I came to tell you," he said, "that my father says you can spend the night at our farm. It's likely to be cold out here." He looked at my flyer and blinked. "Is this your link?" he asked.

I had to laugh. "No. It's my flyer. The link is inside. It's a communications device. What drives it."

In my mind, I was figuring out that I might as well take the semi-hospitality of the farm as stay out here, in the cold, at night. The flyer was dead, and was likely to remain so for days. And, if it should come to life, I'd already missed my important meeting in Paris.

I might as well be a couple more hours later.

The company would have gotten the announcement of new technology, whatever it was, and would already be making what adjustments it could to the improved capacities without me.

To be honest, they didn't need me for it. I'd picked capable subordinates.

They would know what to do and, provided they knew I would be looking over their choices later, they weren't likely to do anything too foolish.

I hoped.

I turned to the youth, with his bad case of acne, and his too-long legs. "All right," I said. "I will spend the night at the farm."

He had his hand on the smooth, silvery side of my flyer, and it took him a few moments to realize I had accepted his invitation.

It was less unpleasant than I expected. Not to say it was pleasant. It wasn't that.

But the meal had been good and clean—of course, neither vegetables nor the sparse portion of meat would have been radiated for disease, nor examined for the necessary nutrients, so I might very well die of it. The conversation hadn't been lively, but it had been polite.

Well, I hadn't been allowed to say much of my life, and the world outside. I was cut off at every turn by the pater-familias. But I when he started talking about Alexander Dumas, I was able to join in, bolstered by the knowledge of novels I had read for the first time almost a hundred years ago.

It occurred to me, long after, while I lay in the comfortable bed upstairs, in the dark, staring at the naked bulb hanging from the cracked plaster ceiling, that the father of this family was probably no older than I.

When the flyers had been introduced, when life extension technology emerged, I'd been twenty, and I'd embraced it wholeheartedly.

Others had run away from it.

I got up, restless. The lady of the house had offered to lend me a nightshirt, which I'd refused as politely as I could, afraid that if I let go of my suit they would burn it as part of the heretical outside culture, or something like that.

Standing by the window, I could feel the cool evening breeze on my hands and face, but not on the rest of my body. The temperature adjusters were working again.

It was very late at night, and the village slept.

The smell of the night was sweet—flowers and fruit and growing things. The village was very quiet, except for the singing voice of a man in the distance. He sounded much the worse for the wear. The wind rustled in the trees. Crickets chirped, and things scurried not far away. An howl hooted.

And then, into all this calm, the strangest sound poured—a grating, popping sound.

It had been so many years since I'd heard it, that it took me the longest time to identify it.

A combustion engine. A car. An honest-to-goodness, pre-flyer car.

I tiptoed out of my room and into the night, in search of my possible salvation.

The barn was a good distance from the property. Anyone who'd not been fully awake and alert likely wouldn't have heard the motor.

The engine was set in a shiny red tractor of uncertain twentieth century vintage.

I wasn't really surprised to see the older son of my hosts bending over the tractor's open front, staring at the popping, whirring engine with something like maternal love.

When I opened the door and came in, he jumped, and slammed the front cavity of the tractor shut, then blinked at me, in confusion.

"It is old," he said. "It was here. I painted it. I've been trying to make it work." He swallowed, looking guilty. "It seems a shame to use animals and . . . and our own sweat to till the fields, when we have this, right here. Course, there's not much gas, just a dozen cans or so I found out back, but I think it might be able to work with alcohol and there's plenty of that."

I smiled at him. "It's all right," I said, softly. The boy didn't seem to know when to be and when not to be afraid. "It's all right. I won't tell anyone. But if, please, you could take me to the next village, where I might use a link. There's this really important meeting that happened a few hours ago, and for all I know my office might be falling apart because of it."

He looked at me a long time, "My father wouldn't want me to use this. He wouldn't want me to go to the next village. We only go there if it's life or death and even then not every time."

"But you have the tractor running so well," I said, and batted my eyelashes at him, shamelessly. "You could take me there in no time at all, and be back before your father knew it."

Ultimately, it was his pride in his mechanical prowess, more than my meager attractions, that lured him onto that road.

He spent the first half of the hour-long trip—through roads that had long since ceased being roads and were now well on the way to being absorbed by tall, sparse pine forest—telling me all about filters and batteries and who knew what else.

Even in the good old twentieth century, I'd never cared much for cars and motors. Now, it had become a bewilderment, even the terms a blur.

Then, halfway to the next village, he

started asking questions: about healing drugs, rejuv, how fast you could get from there to a place halfway across the world.

I answered honestly, neither trying to lure him to our world, nor to scare him into staying in his. I told him of the wars—of religions that became fanatical cults when faced with competition coming near—at their doorstep. Of people so scared of technology that they were willing to bomb wave-transmission towers to bring flyers down for a few moments, a few hours, a few days.

The tractor bounced us gently across the uneven road.

"And what do you do?" he asked.

Lights of the next village—obviously better lit, more modern, than his native one—shone in the distance through the brambly trees.

"I mean, the meeting you missed, your office . . . what is it all about?"

"I work for GuideNet," I said. "The people who maintain the microwave net that guides every flyer." I explained why flyers couldn't be driven by each user. "I'm the . . . I supervise the integration of new technology. And there was something new, in the pipeline. We've bought the rights to it, but I still am not sure what it is. I only got the hype of the interoffice memos and it's supposed to revolutionize travel forever. But I've heard this before. It could be anything from a flyer with a more efficient bathroom, to an improved method of wave transmission."

He nodded gravely, his eyes worried. "My father would have been upset if he knew you worked for GuideNet. He says it's an abomination that will destroy the world. Everything that matters about the world. He says it's like a blender, and we're the peas being mashed in it."

This statement put a damper on the conversation until we got into the village.

There, under the lights, he extended his hand. "I'll go now, before anyone sees me. My name is Edward," he said. "And I'm pleased to have met you. I might . . . I mean, you . . . the world these days sounds fascinating. But I don't know if I'll ever leave the village. There is a lot to be said for it, you know. All the things you talk about . . . religious wars, fear of terrorism . . . we have none of that. But then, you live longer and . . ." He grinned. "I guess I might leave the village some day. But I'm glad the village exists. I mean, I'm glad some people have the option of living differently."

I thought of the night perfumed with flowers, the silence interrupted only by crickets and owls. In a way, I was glad too.

A few hours later, the alarm about the net having been sent and a fly having picked me up and taken me to my downed vehicle, I was on my way to Paris, and calling my assistant, Dewar, on the link.

"So, what's the new technology?" I asked him. "A new method to flush johns in flyers?"

But Dewar, whose holographic image smiled at me above my keyboard, shook his head, looking flushed, shocked, like a man who has taken a blow to the head and hasn't fully recovered. "No," he said. "No. Wait till you hear this. It's a teleportation device. One place to the other, with the coordinates. No net, no waves, no flyers. Instantaneous. And we have the rights." He rustled the papers in front of him. "It's probably going to start being used by the end of the year. And, guess what? You can go anywhere, anywhere at all instantly. People will be able to live in Australia, work in New York. Or vice versa. Or . . . anywhere at all. We are no longer bound by geographical coordinates. The world has become one large city."

I heard my own voice give instructions for how to proceed with the project. But in the back of my mind, I saw the village, with its secure, segregated calm.

They weren't safe anymore. ■

COWZILLA

Geoffrey A. Landis

The controversy over gene-modified food reached its peak in the year 2010, when a breakthrough in the analysis of the functional capabilities of the ribosome made it possible for genetic engineers to construct an artificial gene to allow cows to grow bones reinforced with buckytube fibers. This genetic modification improved the strength to weight ratio of cows by a factor of roughly a hundred. Engineers from the conglomerate Microsoft-Borden-Dupont capitalized on this by gene-designing a new variety of cow, identical in shape and disposition to the old-fashioned cows, but a hundred times larger and producing a staggering improvement of a million times more meat per cow, as well as—for the milk-producing variety—a million times more milk.

"Supercow^{TM}," the MBD public relations department tagged them. "Cowzilla!" retorted the protesters.

A coalition of anti-technology protesters and cattle ranchers immediately called for the destruction of all supercows and a boycott against the meat, which, at a cost of only a few cents per pound, was threatening to drive old-style beef entirely off the market. Meanwhile, animal-rights groups in the United States sued for ethical treatment of supercows, and various other public-interest groups either called for banning cowzilla technology as an affront against nature, or else litigated for protection of supercows under the U.S. endangered-species act.

In hindsight, it should have been obvious that eventually supercows would escape from their megafarm pastures and begin to breed in the wild. Once they escaped, who could herd such an animal? And an escaped supercow certainly couldn't be killed, even if the army could avoid a court injunction from the various watchdog groups. A supercow is barely bothered by ordinary machine-gun fire, and, while a concerted effort with howitzer fire will eventually destroy even a fully grown cowzilla, the first time one was killed by such a method, the million-ton carcass could not be cut apart and hauled away before it began to rot, the heat from its own internal decomposition exploding it and sending meat over an area of a thousand square miles. Over a million people had to be evacuated, and the region declared a biological disaster area. After that, the American president signed emergency legislation making it a federal offense to kill a supercow.

Eventually it was realized that cowzillas posed no actual danger. Even-tempered both by nature and by engineering design, for the most part they avoided stepping on people, buildings, or cars, and grazed placidly on the foliage at the crowns of trees.

In a few years, supercows had swum both oceans and made their home on every continent except Antarctica.

Today, a hundred years after the first supercows crossed the Atlantic and began to appear in Europe, no one would like to go back to the old days. Mountaineers discovered a exciting new sport, cow climbing, and what adolescent hasn't had the experience of being dared to take an illegal ride on a cowzilla hoof, as it steps a hundred meters in one leisurely (but exciting!) arc? In northern Siberia, some nomadic peoples have learned to erect their winter tent-villages on the backs of cowzillas, keeping warm through the long arctic night with natural biological heat. The methane emissions of these friendly giants have even been credited with contributing to a significant extent to the greenhouse warming that makes today's climate so benign compared to the fierce storms and frigid winter recorded by historians.

Towering two hundred meters high, a fully grown cowzilla is an awesome sight. Everyone's heart is warmed by the sight of one of these gentle giants wandering placidly across the landscape, and who could fail to be thrilled the first time they hear—or rather feel—the indescribable subsonic "MOO-OOO!" of a cowzilla, an experience that has been described as like getting a full-body massage in the space of a few seconds, leaving you limp, relaxed, and at peace with the world. Indeed, everybody loves their local cowzilla, daintily stepping over houses and nibbling at the tips of trees.

Certainly, the occasional village has to be evacuated due to an unfortunately-placed cow-dropping—but the gain in added soil fertility far outstrips the inconvenience of the temporary evacuation for the year or so it takes for the smell to go away.

Yes, everyone's life has been immeasurably enriched by the addition of these bovine behemoths to the complex circle of life on our living planet, and, today, it is hard to imagine life without them. ■

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LSST—The Dark Matter Telescope

There's a new astronomical telescope project in the works, the Large-aperture Synoptic Survey Telescope or LSST, sometimes called the Dark Matter Telescope. The LSST is a most unusual telescope, both in its design and in its goals. It is designed to provide fast electronic images of a very wide swath of the sky. It is designed to investigate some of the most intriguing questions in astronomy and astrophysics, including issues relating to dark matter, dark energy, supernovas, gamma ray bursts, objects in the far reaches of the solar system, and dangerous asteroids that cross the Earth's orbit and could produce catastrophic collisions. I'll start by considering these LSST goals, one at a time, and then focus on the design and funding of the project.

Dark Matter—Recent astrophysical results tell us that normal matter, the stuff of which galaxies, stars, planets, and people are made, accounts for only about 4.4% of the mass-energy in our Universe. The rest of the Universe's mass-energy is 23% dark matter (ghost particles of some unknown kind) and 73% dark energy (energy stored in the vacuum itself). One of the main missions of the LSST is to gather images that tell us more about the dark matter. It seems strange that a telescope would be designed to look at dark matter, stuff that emits no light and is known to us only because of its gravitational effects. But those gravitational effects carry their own signature—the gravitational lensing of distant galaxies. In a previous column, "The Rainbows of Gravity," (*Analog*, November 1988) I described the way that gravity bends light to produce "Einstein rings" and related streak-images—highly distorted ring-like images of background stars and galaxies. Gravitational lensing tends to stretch and distort the image and can produce the illusion of luminous objects that appear to be millions of light-years in length. Such distortions can be systematically used to get at the underlying mass that produced them.

However, rather than looking at individual distorted images (called "strong lensing"), the LSST plans to use multi-wavelength deep imaging to measure the overall "shear" or stretching of all the images viewed by the telescope in a given region ("weak lensing"), and to use these data to produce a "tomographic" three-dimensional mass map of all the dark matter in the Universe. Using the relative distortion of background galaxies at different distances (obtained with long-exposure multi-color images) one can solve for the most likely space-time distance and size of the lensing mass. With 3-D mass tomography of the Universe, the LSST will detect hundreds of thousands of mass concentrations of dark matter distributed over look-back times of one to eight billion years. In this way, we expect to learn much more about the nature of dark matter.

Dark Energy—In two previous columns (*Analog*, May 1999 and January 2001), I described the evidence from supernova and cosmic microwave back-

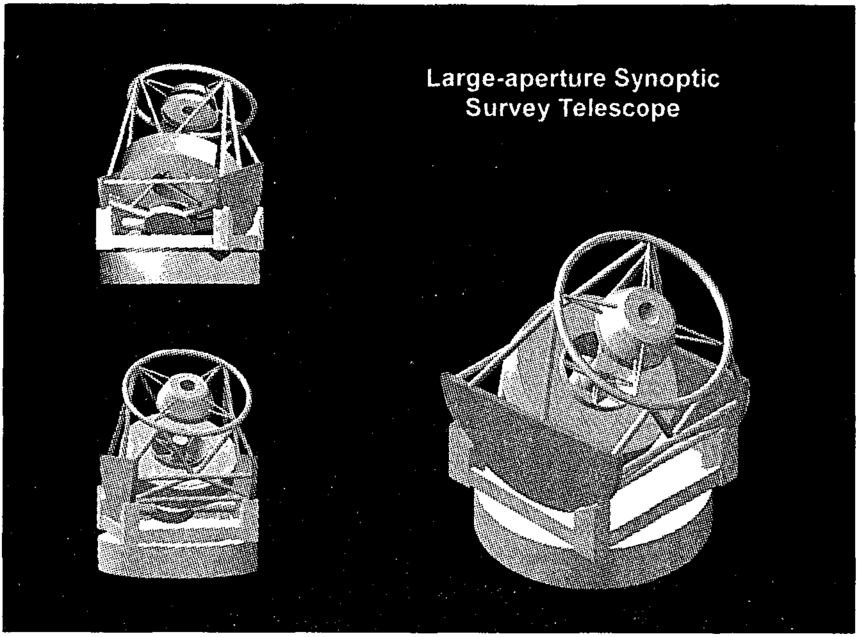


Illustration by Wolf Read

ground data indicating that about 73% of the mass-energy in our Universe is in the form of some mysterious "dark energy" present in the vacuum itself. Dark energy produces a negative-pressure antigravity effect that causes the expansion of the Universe to accelerate. Dark energy has two distinct effects on the Universe: accelerated expansion and the growth of mass structure. The weak-lensing effects probed by LSST will provide a direct measurement of the growth of mass structure. This view of dark energy should be completely independent of other information we have, i.e., data from Type Ia supernovas and cosmic microwave background, and should constrain the properties of dark energy in an important new way.

Short-Duration Astronomical Events—The task of the LSST is gathering light with an 8.4-meter mirror and recording a high-resolution image of a fairly large patch of the sky with an electronic camera. The LSST is designed to make, in a 10-second exposure, an image of objects of the 24th magnitude (6.3×10^{-10} times dimmer than the brightest 1st magnitude stars in the sky), covering seven square degrees of the sky. It is expected that this unique capability will reveal much of the brief "fireworks" in the sky that we might normally miss, for example the flash of blue light from red-shifted bursts of ultraviolet light produced by the most distant supernovae.

But the real payoff of the LSST should come from totally unexpected phenomena. No other telescope system is equipped to watch the sky for such dim short-timescale phenomena. It's an excellent bet that we will see things that no one has thought of or predicted. And the results should be available immediately. The LSST designers plan to have an automated system that would release data from such sources over the Internet as they occur, to be used by the astrophysics community for correlation with satellite observations at high energy and for follow-up studies with other telescopes.

Investigation of the Outer Solar System—The solar system is fairly well mapped out to the orbit of Neptune, but beyond that boundary, little is known. There has been some recent progress in identifying large objects in our solar system in the Kuiper Belt beyond Neptune's orbit, but there could be large bodies, perhaps even of planetary size, of which we know nothing. It requires a detailed understanding of the link between our solar system and those being discovered around other stars. In other star systems, there is evidence for extensive material at large distances from the central star, in some cases extending to 1,100 AU from the star. No one knows if our own solar system follows this pattern.

The LSST system, highlighting objects that move or change intensity with respect to the background stars, should greatly improve the study of the outer solar system, and should shed light on its formation. It should also provide information on how star formation in general proceeds.

The objects in the outer solar system are the most pristine material left over by the original protoplanetary cloud. The orbiting material out there may contain up to thirty trillion objects. We need a sample of at least 10,000 such objects to definitively sample both the spatial distribution and mass distribution of the cloud. The large telescope aperture and field-of-view of the LSST cannot be traded for longer exposure time on a smaller telescope because the objects of interest are faint and move rapidly. In fact, most solar system objects that are discovered are subsequently lost because they are not monitored long enough to get a sufficiently precise orbit.

And of course, there is the potential for totally unexpected discoveries in the outer solar system. Not only may we find new planets the size of Pluto or larger, we very likely will find objects with physical characteristics quite unlike those of the currently better known classes of solar system bodies.

Near-Earth Objects—In a previous column (*Analog*, January 1992), I discussed the surprisingly high probability that one might be killed by an asteroid impact on the Earth. Asteroids are surprisingly dangerous. If a big one hit the Earth at the wrong place, it could kill many people. And a sufficiently big one could kill everyone.

As it turns out, the odds are about 2.4 times greater that you might be killed by a asteroid or comet impact than by an air crash or a tornado, both taken together. The probability of death-by-asteroid is so large, of course, because the calculated odds are the product of the chances of an asteroid strike (small) and the number of deaths predicted to result from it (very large in some cases). We are coming to the realization that both as individuals and as the human species as a whole, we are running a significant risk of extinction. All of our eggs are in one pretty blue basket, and the solar system has the unpleasant habit of throwing large rocks at that basket.

But how many such rocks are out there? There are tens of thousands of uncharted Near-Earth Objects of significant size. Alan Harris of JPL has shown that the sky must be surveyed several times per month at a sensitivity 100 times greater than that used in current searches for Near-Earth Objects to find objects down to a 300 meter diameter. The LSST, together with a wide-field camera and a fast computer, could do this job very well.

The discovery of Near-Earth Asteroids is time-critical and coverage-dependent. Today, smaller asteroids are detected only when they get close to the Earth and show a large apparent motion against the background stars. The LSST, because of its sensitivity, can catch such asteroids farther out, when their apparent motion is smaller, making it easier to "connect the dots" and catch them with automated software. The LSST could also sample a larger volume of space for them and so catch a greater number with each look. Both throughput and telescope aperture are important for a complete systematic survey.

The 300-meter asteroid size mentioned above corresponds to a limiting magnitude of 24. Detection in short exposures is needed, since the asteroids smear very quickly for exposures of more than 20 seconds, making large aperture important. The utility of such a survey would be diminished if it could not cover the entire visible sky several times per month, since there would be no other telescopes that could cover the holes or even follow its discoveries. Present systematic surveys like Spacewatch have difficulty even in finding all of the 21st-magnitude Near-Earth Asteroids. With its capability to detect objects as faint as 24th magnitude in 10 seconds, the LSST should be able to find all of the significant Near-Earth Objects down to 300 meters in size.

So that's the menu for the LSST, everything from fundamental cosmology to asteroid safety. The remaining questions are those of design and funding.

Design—The LSST design calls for an 8.4-m aperture using three mirrors and covering 3 degrees of field diameter. The design takes advantage of advances in optical fabrication and detectors to obtain high-quality imaging capability. Its "etendue," the product of collecting area and field of view, would be ten times greater than any other existing or planned telescope. Its focal surface would be equipped with circular mosaics of imaging detectors 55 cm in diameter, using CCDs for wavelengths 0.3-1 μm. These would record the three-degree field imaged at f/1.25. Interference filters 60 cm in diameter would be used to select wavelength bands as narrow as 3%.

The LSST telescope structure is centrally balanced and very compact, only slightly longer than the primary mirror diameter, and would need an enclosure much smaller and less expensive than standard 8-meter telescope designs. In a run of three to four clear nights, the fast-slewing telescope could survey the entire visible sky (20,000 square degrees) to a limiting magnitude (5 sigma) of V=24, I=23. Alternatively, in 50 hours of observation, an 8-color composite image of a single 7-degree square degree field could be made to 5 sigma limiting magnitudes U = 26.7, B=27.8, V=27.9, R=27.6, I=26.8. (Here, U, B, V, R, and I characterize the magnitudes of objects visible in standard astronomical wavelength bands ranging from U=ultraviolet to I=infrared.)

Funding—The price tag for the LSST is around $150 million—quite small for a space project, but fairly large for a ground-based telescope. Since the LSST would be built on the ground, with no involvement of the shuttle or space station, the NASA science policy makers have decided they are not interested. This means the funding would have to come from other sources, probably some combination of private sources and the National Science Foundation. The LSST proponents are now in the process of securing such funding, and the prospects for finding all the money needed are good.

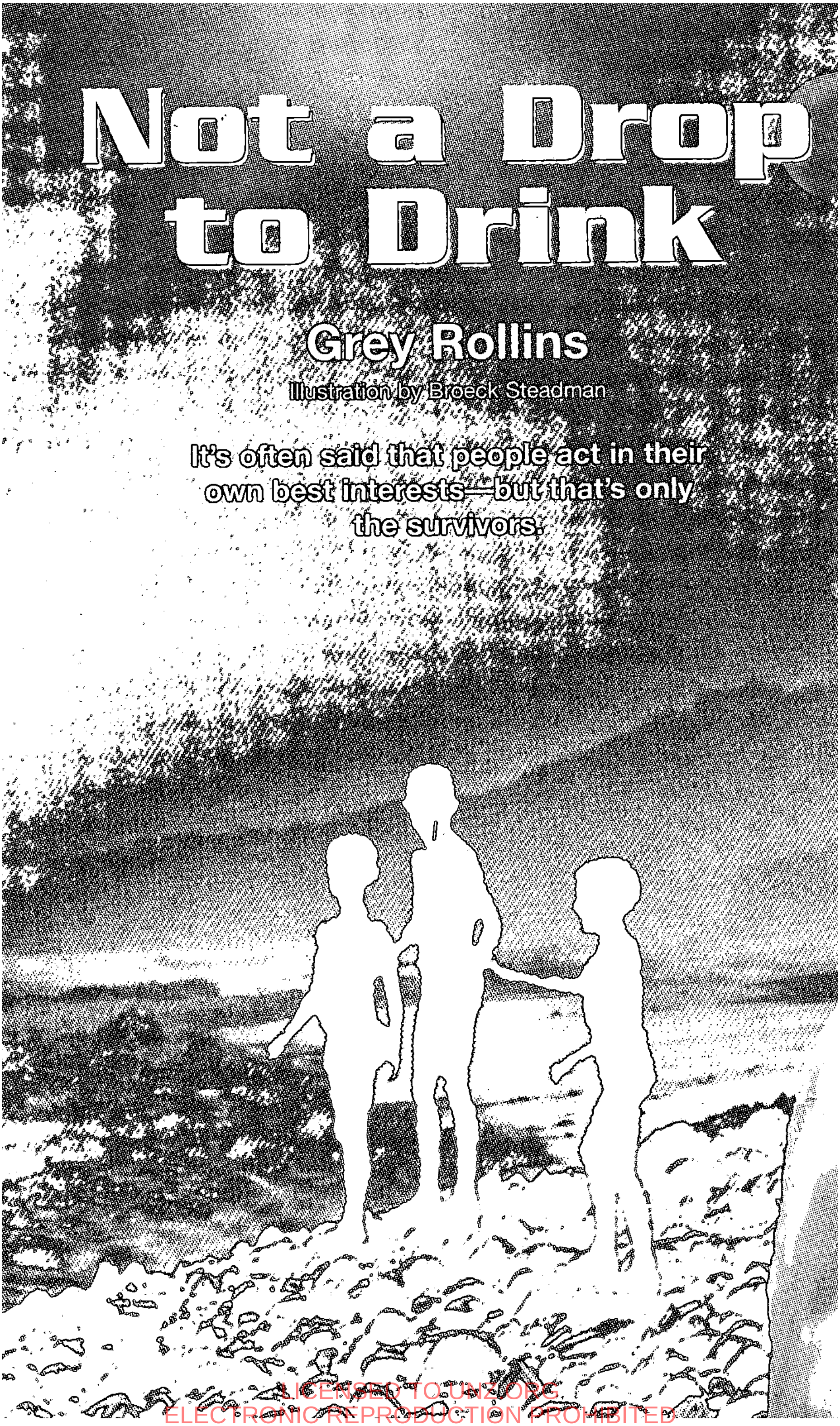
Watch this column for further developments in this cutting-edge science project. ■

AV Columns On-line: Electronic reprints of over 110 "The Alternate View" columns by John G. Cramer, previously published in *Analog*, are available on-line at: http://www.npl.washington.edu/av.

References: *The LSST Project*

"Large Synoptic Survey Telescope: Overview," J. Anthony Tyson and the LSST Collaboration, available at http://www.dmtelescope.org/Project/docs/tyson4836-04.pdf_

See also the LSST Observatory Home Page at http://www.dmtelescope.org/lsst_home.html and the links contained there.



Not a Drop to Drink

Grey Rollins

Illustration by Broeck Steadman

It's often said that people act in their own best interests—but that's only the survivors.

Lalo Helsink stood looking out to sea, watching the late morning sun strike sparks from the tumbling water as waves crashed into the rugged basalt cliffs beneath his feet. His brow was furrowed and his thoughts were troubled.

Though he uttered not a sound, inside he was screaming, *It's not fair!*

But no one had ever promised him that life was fair. It was up to him to make the best of things, no matter how the cards were dealt. He and his fellow colonists had to face the fact that they were running out of water, and that even severe rationing would only delay the inevitable.

But the children . . . what about the children?

Were they condemned to die simply because their parents had made a mistake?

The setting sun behind them cast slanting rays out over the dark, heaving sea to the east. A vast storm system was thrashing the ocean hundreds of kilometers offshore—the undulating surface of the water gave witness to its violence—but the storm would never arrive at the colony, and that was the problem.

"It's as though the ocean is struggling to bring the water to us, but it can't," Catherine Helsink said.

Lalo turned from the window. "The weather patterns are against us, I'm afraid."

His wife encircled him with her arms and snuggled her head into the hollow of his shoulder, kissing his neck. "It's a pity that the survey team didn't foresee this."

"I suppose they did the best they could."

"We trusted them," she said quietly.

"Can't change that now," he noted. "It'll be twenty years or so before the next ship gets here. By then the problem will have resolved itself, one way or the other. We're on our own."

She nodded, her head bobbing gently against his

and said nothing further,

ening around his waist.

Even without telepathy, he knew what she was thinking. *It's not fair!*

A survey ship had studied the planet for two years to answer one deceptively simple question: Is this place fit for human habitation? There was only one possibility, really: the smallish continent at high latitudes in the northern hemisphere. There were two much larger continents in the southern hemisphere, but one was almost entirely low-lying swamp. The other, called Baranain, was beautiful, but was also home to a wide spectrum of wildlife, among which were a half-dozen highly efficient predators. The only way that humans would ever feel secure living there would be t

wipe out the predators, which woul

eventually destabilize the ecology.

The interior of the continent whe

the colonists lived was largely des

the cause being an extensive moun

range about twenty kilometers fron

coast that caught moisture as it ca

off the ocean. In the long, narrov

of land between the mountains a

sea, the rain was quite sufficient

usual cool climate crops.

Or had been.

The drought had begun six

viously. At first, the settlers

was simply a short term varia

weather patterns. When eve

indigenous plants began d

came obvious that there w

problem. Large tracts of

most completely barren

digenous wildlife was bec

"All right folks . . .

meeting to order. You a

issue is—"

"And we all know

is," came a rasping vo

Wilson Staunton

wondered why he h

mayor. It was a fore

the same people would say the same things. "Thomas, we can't move the colony to Baranain. We've got way too much infrastructure here that we can't move in the boats we've got—they're too small. We don't know where the mineral deposits are, so it would be a matter of luck as to where we should site a new colony. Even if we knew where to set up, we'd still have the very devil of a time keeping the critters off our backs while we worked. Not to mention about skeighty-eight other very good reasons, including the fact that, for all we know, Baranain might be having a drought, too. In other words, sit down and shut up—you're overruled. Besides, I didn't recognize you, so you can't have the floor."

"But—"

"I said sit down, and I meant it. We all know what you think. If we want to hear it again, we'll ask for a repeat. Does anybody *else* have an idea? Preferably a new one that hasn't had all the edges worn off already." Staunton looked to a man in the front row. "Pete, you had any success?"

Pete Davis stood, already shaking his head. "Just finished drilling another test hole the day before yesterday—it came up dry again." He shrugged. "The rain was recharging the aquifer . . . but when that stopped, the water table began falling. At this point, even if the rain began tomorrow, it would take years before it percolated down to the aquifer. We're lucky to have two good wells. There are a couple of springs in a cove up in the mountains that we know of, but they're so small and so far away that it's hardly worth the effort to go get the water." He made a wry face. "And that's assuming that they haven't dried up since the rain quit. Nobody's been up there in a couple of years."

Staunton grunted. "Okay, Lisa, your turn."

Slight, blonde, and thirty, Lisa Mullens stood. "I've been making glass as fast as I can, and the stills are coming along, but I'm not going to be able to do more than put a Band-Aid on things. It's just not warm enough here for efficient stills."

Staunton nodded sympathetically. "We're as far south on this continent as we can go and—"

"Like I keep saying, we've got to go to Baranain—"

"Shut up, Thomas." Wilson Staunton shook his head. Things were going about the way he'd feared. Yet, he had to go through the motions. If only there were some way to—

"Um, Wilson?"

"Whozzat?" Staunton peered towards the back of the room. "Andy? That you?"

"Yeah, uh, look . . . I know it's not all going the way we want and everything, but I thought I'd throw in one thing that no one else has."

Staunton blinked. Honestly, a new idea was the last thing he'd expected to hear, but to have it come from Andy Weems made it seem twice as unlikely. "Well, go ahead, Andy. Anything new is a welcome relief from hearing all the same old bad news over and over."

Andy had been virtually invisible since the day he'd been born. Red hair, freckles, and a frame that seemed more skeleton than anything else, he was so quiet that people tended to forget that he existed. "Look, I know we're having trouble with the water and all, and there's only enough water for crops or for people, but not for both, and—"

"Any idea when you'll be getting to the point, son?" Staunton asked in as kindly a tone as he could manage. He didn't want to frighten the poor fellow, but Andy tended to ramble and a town meeting wasn't a good time for that.

"Er, uh . . . right. It's the kids. We could fix them, you know."

"*Fix* them?" Staunton asked, one eyebrow raised.

"Yessir. Fix . . . oh, I see, you thought I meant like fix them like you'd fix a dog, so it couldn't have puppies. Oh, no, it's not like that. I'd never want to make it so—"

"Andy." Just the one word nudged Weems back on track, cheeks flaming red.

"Right. Fix. Uh . . . okay, so what I did was to start looking at the charts and doing a little work-up here and there. Simulations, you know. Had to make sure that it would all go the way I was hoping, since there are so many variables—"

"Andy."

He stopped dead that time, swallowed visibly, then went on. "We could give the kids salt glands."

Staunton paused, wondering if this was supposed to make sense. "Perhaps you'd better explain what a salt gland is, son. You seem to have left me behind."

"Well, back on Earth they've got these animals called penguins. Penguins live in the ocean, and all the oceans on Earth are salty just like they are here. Well, not quite the same—the composition of the dissolved load is tilted a little more towards potassium—" This time he saw the look in Staunton's eye and changed course without waiting to be prompted. "Okay, okay . . . but it's interesting, you see. Anyway these penguins, they swallow a lot of salt water, and their bodies don't need that stuff any more than ours do, so they excrete it—the excess salt, that is—via these salt glands. I've been looking at our genetics and I can do it. I can give the kids . . . our human kids that is, salt glands. And if I do that, then they can drink the water straight off the beach. Don't need to worry about water any more, just pipe some sea water up here to the houses and drink it. That'd leave all the water Lisa's making for the crops."

The room went silent when he finished. Too silent. A certain amount of background noise was normal and healthy in a gathering of this size, but there was virtually no sound at all. Staunton felt it incumbent upon him to say something, but for the life of him, he couldn't think of a single thing.

Pete Davis was the first to gather his wits. "Um, Andy, couldn't you just rearrange something in the plants so that they were able to deal with the salt? That would leave the fresh water for us."

Andy shook his head apologetically. "No, that wouldn't work so well. They left us a bunch of ways to look at and fix genetic problems in ourselves. We've got to be able to avoid inbreeding, and fix any hereditary stuff that might crop up . . . oh . . . crop . . . I didn't mean to say that, I wasn't trying to make a joke—"

"Andy," Staunton prompted.

In a rush, Andy spilled out, "The plants they left us were already as close to perfect as they could make them. They balanced nutrition, and yield, and disease resistance, and all this other stuff, and if we start trying to get in there and tinker, we're liable to knock it all out of kilter, 'cause it's all interrelated now. It's like a house of cards—touch the wrong thing and it all comes tumbling down. But *we* haven't been touched. Lotsa raw material. We can be fixed—optimized for this planet."

"Say *what?*" Al Tilson demanded. "I thought maybe you were saying something about—I dunno—something that you'd carry around or whatever. But . . . you want to change *us?*"

"I don't want to, Al, but we've got to do something."

"But no one has ever done anything like that before. What if something goes wrong? We could end up with a worse problem than we've got now."

"Worse than death?" Staunton asked rhetorically. "If nothing changes, we're going to die when the amount of water that we've got drops below the amount necessary to support both the food we eat and our own needs."

Tilson turned on him. "Maybe someone will think of something. We just need more time . . . not some idiotic, half-baked scheme to brew up a batch of test tube mutants!" he said, flinging a scornful arm in Andy's direction.

Taking a deep breath, Staunton said, "Time is something we're running out of, Al. We've been saying 'maybe someone will think of something' for so long that the phrase has blinded us to the fact that no one has actually come up with anything. We just keep having meeting after meeting where people say that maybe *next* time someone will bring in a new idea. Well, Andy's just come up with the first new thing we've heard in I don't know how long. Let's—"

"It's against God's will," Agnes Beeson declared, standing. "We were made in the image of God and it would be a sin to break the mold that was created for man."

Staunton groaned inwardly, realizing that he was going to have a difficult time regaining order. "People . . . please, let's not get carried away. At least Andy's brought a new idea to the table."

"It's a *sin!*" Agnes cried out. "We must not go against the will of God."

"Is it the will of God that we die?" Lisa asked. "This isn't a . . . a conventional solution, but it may be our only way out."

Agnes sneered, "All you want to do is set yourselves up to play God."

Lisa was clearly beginning to get angry. "Agnes, I'm not sure I see how building water stills equates to playing God. All I'm saying is that we shouldn't dismiss the idea out of hand. Take some time . . . think about it. It's not as though we have so many ways out of this that we can afford the luxury of throwing away something that might be our only chance."

"I don't have to think," Agnes snapped. "I already know it's wrong. And so would you if you weren't—"

"Agnes, that's enough," Staunton said crisply. He wasn't sure where he stood on this, but he didn't intend to be stampeded into rejecting the concept outright. He set his jaw, and looked back to where Andy was standing, white-faced. "Andy, I guess it's going to take a little discussion before we can come to terms with this."

Andy nodded tightly. "I know. The thing is, this will take time to set up. It's not something we can wait until the last minute to do. Since I can't change things in an adult, I'll have to work on the genetic level to code this into the developing fetus so that it's an integral part of their bodies. I'll need time to run tests and set up a program that will allow me to work with—"

"But they're our *children!* You can't just go meddling with God's plan!" Agnes raged.

Andy shrugged, palms up. "It's that or die."

Catherine Helsink had listened carefully to Lalo's description of what had been said at the meeting. Afterwards, she was quiet for so long that Lalo began to feel uncomfortable, as though she had left the room, somehow leaving her body behind. Finally, she said, "And it's little Andy who came up with this?"

He smiled. "He's not so little any more, babe. Twenty-four, maybe? Something like that. He's invisible most of the time, but suddenly he seems like he's decided to make up for lost time."

"Or at least he's the only one with a workable plan. But it scares me."

Lalo nodded. "Me, too. And just about everyone else, it seems. They immediately took sides against Andy. Between Thomas going into his Baranain routine and Agnes screaming about the will of God, it was a wonder anyone could hear himself think. I left before they finished yelling. For all I know, they're still at it."

"I'm not sorry I missed the meeting," Catherine said. "From what you say, I'd have lost my temper and sent them all to bed without supper for being so ill-mannered." She shook her head. "And yelling at poor Andy, who's only trying to help . . . well, what do you think?"

"Of his plan? It's different. It's *very* different. No one has ever done this kind of thing before, and though I'm sure if Andy says it's possible, it must be, I still have this fear of the unknown."

She considered this for a moment. "It's one thing to have children and know that the genetic dice will roll a bit.

At least you can live with the idea that they may have their mother's eyes, but their father's mouth. But this . . . I don't know. This goes farther."

He nodded grimly. "You're not simply rolling the dice, you're playing with loaded dice, trying to force it to come up lucky seven. We need a salt-tolerant version of humanity, but we don't have time for evolution to take its course. So we build a mold and pour in the raw materials of life. In a way, Agnes is right, this is the prerogative of the gods."

"But if we don't do it, we die." She sat back, tears in her eyes. "Why does this have to be our decision? All I wanted was to have some children, but now it looks as though our only options are to raise mutants or watch normal children die a horrible death."

Lalo sighed. "My love, life is what it is. Our duty is simply to decide how to respond to the challenges."

Agnes Beeson sat on a hard chair, staring out at the brown, parched remnants of what had been a small lawn in front of her home. Her lips were pursed and her expression was grim. "David, why didn't you speak up at the meeting last night?"

David Povachek glanced guiltily down at the floor. "I don't know. It just didn't seem like there was anything to say."

She turned from looking out the window, her bleak gaze transfixing him. Her words were simple enough, but her tone cut like a knife. "Nothing to say?"

"I don't know anything about genetic stuff, Agnes."

"But you know about the word of God, don't you?"

"The Bible doesn't say anything about genetic engineering!"

Agnes sighed, and turned to look out the window again. "David, I'm disappointed in you." She sat looking out at the dead grass for a time before saying, "Who created man?"

"God did."

"That's right. And don't you think that God knew what he was doing when he created man?"

"I suppose so."

"God knows what he's doing, David. It's not ours to try to interfere with what he has planned for us. Our place is to accept God's will and be glad."

"But—"

"You said that the Bible doesn't say anything about genetic engineering. It doesn't . . . and yet it does. All you have to do is read the Bible and believe that God has a plan."

"But how are we supposed to know what the plan is?"

She smiled thinly. "We don't need to know what the plan is. It's God's plan. But if God created us the way that we are, then this is the way he intends for us to be, and if we change that . . . it would be as though we were saying that we knew better than God did, right?"

"Well, yeah, I guess."

"So why didn't you speak up last night?"

His mouth twitched. He'd been caught off guard. "Uh, I don't know."

"If I get up and say something in a town meeting, I'd like a little support next time, David. If you don't quite understand what it's all about, just drop by here the next day and we'll talk about it." It was a pity that none of the other members of the prayer group had been there the night before; just David, and he'd failed her. At least Al Tilson had come out against the idea, even though he wasn't part of her prayer group. She made a mental note to talk to him later—to find out where he stood on spiritual matters.

David, meantime, was nodding slowly. "All right."

As David left for home, walking across the dead grass, Agnes Beeson shook her head. She'd known his parents and had been as shocked as anyone when they'd both died in a skimmer crash. There'd been some debate in the community as to what to do, but he'd been nearly of age and had wanted to continue living at home. She'd taken him under her wing, discovering in the process that he hadn't been raised in the manner she'd expected through knowing his parents. But then, just because people are good themselves doesn't necessarily mean that they make good parents. Agnes had clear ideas on how children should be raised, and tried to correct David's behavior. Sometimes he took gladly to her guidance. Other times he seemed to withdraw and become sullen.

Obviously, now that this absurd genetic engineering notion was in the air, she would have to make certain that she had more right-thinking people at the town meetings. David was clearly unreliable; she'd need people she could count on. She began making a mental list of the people to contact. There was work to be done.

A little after noon, Lalo Helsink sought out Andy Weems. He had questions of both practical and abstract natures, and wasn't going to ask them in a public forum where he might not ever get to hear the answers for the shouting. But when he got to the building that housed Andy's small clinic, he found that he wasn't the only one who'd thought to ask questions. Lisa Mullens was there, too.

She was perched on a lab stool off to one side, watching Andy stare intently at a screen filled with gene sequences. They were scrolling by more rapidly than Lalo's eye could follow them, but Andy didn't seem to have any trouble following the patterns.

"Good afternoon, folks," Lalo said as he came in. "Andy, I wanted to pick your brain for a few minutes, if you don't mind."

Andy gestured vaguely without looking at him. "Um, pull up a stool. I'll . . . uh . . . there it is." The screen stopped scrolling. The pattern of nucleic acids displayed didn't mean anything to Lalo, but he assumed that they were related in some way to the salt-tolerance issue.

Lisa said, "I don't know enough about the subject to know what to think."

Andy grinned crookedly. "Agnes doesn't know anything about the subject, either—at least not the technical aspects—but that doesn't stop her from having an opinion . . . a very strong one, it would seem."

"I can't say that I'm comfortable with the idea," Lalo admitted, "but we need to do something."

"Hell, *I'm* not comfortable with it, Lalo, and I'm the one who brought it up. All I'm saying is that it's a possibility. It'll take time. Keep in mind that we will have to be around in order to raise the children. And—although I didn't bring this up yesterday—there could be failures along the way, possibly grisly ones. It seems straightforward given the tools at our disposal, but perhaps I'm just overconfident."

"What would be involved?" Lalo asked.

Andy shrugged. "We've got the genetic blueprints for most every creature on Earth here in our database. I could, in principle, build an elephant from scratch, or a bluebird, or a tiger. More to the point, I've got the gene sequences for penguins and sea iguanas and such. It's all nicely annotated. All I'd have to do is pull out the genetic code for salt glands and splice it into a human zygote."

"So then what? We'd have people who looked like penguins?" Lisa asked.

"Oh, no, nothing like that. No tuxedos or anything, if that's what you mean. They'd look just like us, pretty much. The salt glands wouldn't show if I fiddle it properly. I'm also hoping to find a way to coerce the kidneys into taking on some of the load." He gestured at the display at his side. "But I've got some more work to do on that."

"I still don't understand what a salt gland is," Lisa said.

Andy hitched himself up on the stool and said, "The water here is somewhat saltier than it is in the major oceans on

Earth, but it's still far from a saturated solution. The glands would remove water, concentrating the salt, then excrete the brine. The purified water goes back into the bloodstream. Extra salt in the urine wouldn't be noticed, for instance, but someone outfitted like this would cry salty tears all the time. As the tears dried, they'd leave salt tracks on peoples' cheeks. I guess I'll have to toughen the skin of the cheeks a bit to withstand the salt, but should be about all that would be necessary."

"That's all? And we could just drink seawater?" Lalo prompted.

"We? No, not us. But our children . . . well, your children, since I'm not . . . well . . . anyway, they could drink salt water, yes."

"But what about us?" Lisa demanded.

Andy shook his head. "We do the best we can, trying to live a normal life span. But the children would all be marvelously adapted to this planet."

Lalo frowned. "What's to stop us from doing something else to ourselves? What if we were to want, say, armored scales and talons so that we could live on Baranain without having to worry about being attacked?"

Andy nodded thoughtfully. "At least in principle, it could be done. But that would be taking things far enough that we'd be departing from anything that would pass as human to a casual observer. Either way, the question is how much modification can we do and still be called human." He shook his head sadly. "Unfortunately, if we don't do something soon, there won't be anyone left to debate the question."

Andy Weems's proposal dominated conversation among the settlers. Many were dead set against it. A few wanted to approach the matter cautiously. No one, including Andy himself, was enthusiastically for it.

"All right, all right, folks, I'm declaring this meeting open," Wilson Staunton began. He sounded as though he wished the meeting were already adjourning.

Everyone began talking at once.

"*Sit* down and *shut* up!" Staunton bellowed. "This isn't a circus, so quit acting like animals."

Catherine Helsink raised her hand.

"Yes, Catherine. You've got the floor."

She stood, looking hesitant. "I think it's clear that Andy's proposal has got people talking, but it's come to my attention that someone has taken matters a little too far. The night before last, someone wrote some stuff on the side of Andy's cabin. Threats and things. Now, we may or may not be for Andy's idea, but we can't allow people to vandalize his cabin that way. I'm moving that someone look into it."

Lisa Mullens abruptly stood and said, "Seconded!"

Staunton's mouth twisted. "Andy, is this true? I haven't been by your cabin in the last few days."

Andy stood, looking nervous. "Well, yes. I cleaned most of it off, but you can still see some of it."

Staunton cursed under his breath. "I ain't even going to take a vote. This is a law and order sort of thing, and should be taken care of regardless of what people think. Can't go acting like that." He looked sternly out over the crowd. "I'm not exactly happy about what Andy's offering, but I ain't going to put up with people vandalizing his cabin and threatening him. Is that clear?"

Although some of the more vociferous opponents to the genetic proposal looked as though they wished Andy would simply cease to exist, there were enough nodding heads to make it obvious that he had support.

"Okay . . . next!" Staunton said.

"Are we still on this Andy thing?" someone asked from the back.

Staunton snorted. "We aren't *on* any particular thing. However, I think that Andy's proposal to, uh, modify people is most likely the topic of the hour. Go on, what's on your mind?"

"I move that we form a committee to

study his idea and make recommendations."

"Dammit, now why do you want to ruin a perfectly good evening by mucking it up with a committee?" Staunton groused. "Just exactly what do you want this committee to do? See if his plan will work? Who have we got who knows enough about what the boy's doing that they can second-guess him? Nobody. Okay, that solves that question. Do you want this committee to compare his idea to digging wells and distilling sea water? Hog feathers! First, it's like comparing apples and oranges. Second, we can do that right out here in a meeting, instead of off somewhere else. That's why we have these meetings. Committees are more trouble than they're worth. Now, does anyone want to second this damn-fool committee?"

Two hands popped up immediately.

A slow, diabolical grin spread over Staunton's face. "Okay, if that's the way you want it, then you three are now the committee to select the members of the committee, and to draw up a clean, clear-cut list of questions that this proposed committee should be addressing. And if you hand me some namby-pamby nonsense like, 'How will it affect the colony?' I'm going to throw the list back in your faces and tell you to come up with real questions. Fair enough?"

"No, it isn't fair! It's—"

"Good!" Staunton called back. "I didn't mean for it to be fair. You call for a committee, I say fight fire with fire and tell you that you're on a committee to start the committee." Shaking his head in annoyance, he muttered to himself loudly enough to be heard in the front three rows, "*Huh!* I'll show 'em committees. Let 'em bog each other down in silly hand-holding." Then, more loudly, "And anything this committee comes up with is just a recommendation. It's not binding in any way, on any person."

"Wilson!" came a preemptory call from mid-way back.

"Yes, Agnes . . . you want the floor?"

"Yes, I do."

"All right, then. Your turn."

"All I want to say is that we should let the Lord handle this. If we were all to pray for a solution, I'm sure that he would hear us and send us a miracle."

Staunton rubbed his jaw. "Agnes, as I recall, the first questions about the water situation came up about three or four years ago, right?"

"About that, yes."

"And your proposal at that time, as I recall, was to pray, right?"

"Well, of course. Prayer solves everything."

"Have you been praying for a solution to this water situation, Agnes?"

She looked at him as though he were daft. "Of course. Every night."

"And has the Lord sent us any rain?"

"Well, no, but if we were all to pray, then I'm sure the Lord would hear us and provide. It's a test of our faith."

"Agnes, I thought God knew everything. If he knows everything, then he's already aware of our problem, right?"

"Well, yes . . . but if we were *all* to pray, then I'm sure he'd answer."

"So God can't hear just you alone? It'll take everyone praying at once to get his attention?"

"That's not what I meant," she protested angrily.

"If God hasn't chosen to send us any rain in the last three or four years, it's because he either isn't listening, or he wants us to solve this ourselves."

"But this thing little Andy wants to do is *wrong*. Nothing you can say will convince me that it's right."

Staunton considered pointing out that she had changed the thrust of her argument, but decided against it. Best just to roll with it. "I'm not trying to convince you that it's right, Agnes. Hell, *I'm* not even convinced it's right. But your methods haven't worked. Pete's wells aren't reaching any water. Lisa's stills work, but can't produce enough. We're running short of solutions, Agnes. If you feel that prayer is the answer, then you pray just as hard as you can. In the meantime, others will be working on other approaches."

Agnes Beeson gasped. "How *dare* you doubt the power of God?" she demanded.

"I don't doubt the power of God, Agnes, any more than I doubt the reality of this drought. Now, have you given proper consideration to the idea that Andy's proposal just might be the solution you've been praying for? I'm not saying whether it is or isn't. It's just something you might want to think about."

"*Gene breakers!*" she screamed.

Harmon Eddings surged to his feet. "She's right! We need to—"

"*Silence!*" Staunton roared. Into the suddenly silent room he said evenly, "Harmon, I didn't recognize you. Sit down. Edwin, you too. And you, Mandy. Now, Agnes, I think we understand where you're coming from, but getting angry and yelling isn't going to solve anything, okay?"

Agnes glared at him. "But there *is* a solution and you won't—"

"Agnes, you've already made your point. Sit down."

"But we need to pray about this!" Sarah Cummings called.

Staunton groaned. "Anyone else got anything they want to say? Any new ideas, maybe? Preferably something we can talk about without all this emotion?"

"I move that we mount an expedition to Baranain!" Thomas shouted from the front row.

"Shut up, Thomas," Staunton said wearily.

The knock was firm. Al Tilson opened his door expecting to find a man, but instead found Agnes Beeson standing there. "Hello, Agnes. How are you doing?"

She glanced past him into the front room of his cabin. "Mind if I come in for a few minutes, Al?"

He shrugged lightly. "No, not at all. What's on your mind?"

She sat in a plain chair made from local wood. "I've been meaning to drop by and see what you think about this genetic thing young Andy's proposed."

He raised his eyebrows. "Ah, well, it's a strange idea, that's for sure. I can't say that I'm all that happy about it, but I—"

"Strange is a good word, I think. It came pretty much out of the blue as far as I'm concerned. Do you happen to know if Andy talked about it with anyone before he brought it up in the meeting the other evening?"

Tilson shrugged. "Not with me, but it's not as though I know all that much about that kind of stuff. I'm probably not the first person that would come into his mind if he wanted to talk about it."

"That's the thing, Al. I've been asking around, and it doesn't seem that he asked anyone before he just popped out with it in the meeting. Something that . . . big you'd think that he'd seek guidance from someone older and wiser, rather than just plunging in and bringing up something that would confuse everyone."

"Oh, I don't know, Agnes. It's not all that hard to understand, really."

"But you said yourself that you were confused. You said you thought it was something you could carry around."

Tilson smiled a bit. "I got it figured out. I just missed his point at first."

"So you agree with him?" Her voice had a tinge of alarm in it.

He shook his head. "I'm not sure whether it's the right thing—"

"Would you be willing to say so?"

He blinked. "Uh . . . I thought I already had."

"I mean *again*, Al. This is a dangerous idea, but there are people who are tempted by it. We need to stand together on this if we're going to keep Andy from leading folks down a false path. He's not very old, you know, and I'm worried that he's brought this up just because it *can* be done without ever once asking himself if it *should* be done."

Tilson steepled his fingers under his chin, elbows propped on the arms of his chair, and sat regarding her steadily for a moment. "What did you have in mind, Agnes?"

"Whatever it takes. This is an important issue. What little Andy wants to do is wrong and it needs to be stopped before it goes any further. If they allow him to proceed with this, then there will be other things later . . . worse things."

"Does 'whatever it takes' include painting things on Andy's cabin?"

Her mouth firmed. "Andy wasn't hurt. No lasting harm was done."

"So you knew about it ahead of time?"

Her lips parted, but it was a second before she spoke. "If Andy quits pushing this foolish idea, it will stop right there. There's no one else who can do it. All we need to do is convince him that it's not wise to take it any further."

"Agnes, you said that if people started on this, there'd be worse things to come. Have you considered that the same thing applies to what you're saying . . . trying to intimidate Andy? What comes next? Have you got any clear limits in mind?"

She stood staring at him, as though she could not believe what she was hearing. "Limits have nothing to do with it. We were not meant to have these salt glands!"

"Agnes, I don't hold with terrorizing Andy. That's no way to treat someone just because you disagree with them."

She stopped cold, staring at him, as though the pure force of her will could overpower him. "I'm disappointed in you, Al. I thought you were a pious man."

"I am, and that's exactly the point. I feel that you should consider whether your actions are in line with what the Bible says. For instance, you might consider forgiveness. The Bible speaks quite a bit about that. Even if you feel that Andy has somehow gone astray, there's no call to threaten him."

"But Satan is subtle, Al. How do you know that this isn't a plot to lead us all astray? You can't prove that."

He shook his head, a faint smile on his face. "No, I can't. But by the same token, you have yet to demonstrate that Andy's idea actually *is* a plot. Our options are limited and time is running out. You made your feelings known at the meeting, but that doesn't mean that anyone who sees things differently is automatically in league with the Devil." He spread his hands. "If we are to avoid slow suicide, Andy's idea may be our only hope."

"It's a *false* hope!"

"Are you saying that it won't work? Are you competent to judge that?" He shook his head. "I know I'm not able to say either way. It sounds preposterous on the face of it, but then I stop and think about all the things they did with the crops that we brought with us. Who would have thought that you could make corn tassels glow at night when the ear was at the peak of ripeness? Somehow they got the stuff out of fireflies and made it sensitive to the level of sugar in the kernels. Seems impossible, doesn't it? Why do you complain about Andy's idea to modify humans, yet say nothing about the modified crops that keep you fed?"

"The Bible says that God gave us dominion over all the plants and animals. What we do with corn is up to us, but we shouldn't change how *we're* made."

"*We're* one of the things in the world, Agnes. That means we have dominion over ourselves. If, in order to survive, we need to change things, then—with luck—we'll be here next year and the year after to offer thanks for allowing us the means to get by."

"I'd rather trust to God to provide," she snapped.

"And perhaps that's just what's happening," Tilson said.

Lalo Helsink saw Wilson Staunton coming before Wilson saw him. He stood in the larger man's path, waiting to be noticed.

"*Huh!*" Staunton grunted, startled out of his preoccupation. "Uh, didn't see you standing there, Lalo."

"Would you have noticed a mountain, either?" Lalo teased.

Staunton grinned lopsidedly. "Okay, maybe not," he confessed. "What's on your mind? Other than being a hazard to navigation, that is."

"There's gossip that people are threatening to do something to Andy again."

Staunton gave an exasperated sigh. "I haven't been able to find out who painted Andy's cabin the first time. I've got maybe a half-dozen people in mind, but nobody's talking, and I can't nail it down without someone coming out and saying something." He shook his head. "I don't like this, Lalo. I don't like it at all. There's nothing wrong with people having opinions. What bothers me is that somebody's acting on his anger—painting stuff on Andy's cabin—and the people who know about it are protecting the culprit."

Lalo thought this over for a moment. "Maybe we need a full-time policeman."

"And how are we going to pay him?" Staunton demanded. "The colony isn't big enough to support something like that. We've never had serious enough trouble to justify such a thing. In the meantime, there's just me, and I'm not getting very far. I don't suppose you've heard anything, have you?"

"I'd be the last person they'd tell. I've been defending Andy's right to propose solutions to everyone who'll listen." He snorted. "And to some who won't listen."

"We've had disagreements before, but never anything that made so many people so *mad*. There are more people going along with Agnes than I thought at first, and out of a large enough group, there will always be a couple who take action, whether it's sanctioned or not."

"The thing to do is to catch the person who did it. If you make an example of one, then the rest may think twice before trying anything else."

Staunton's frown spoke eloquently. "But what if I don't catch them, Lalo? If they get away with it, they'll be bolder next time."

Catherine Helsink was on the verge of tears. "But I don't like *any* of the choices, Lalo!"

He nodded. "I know, babe. I can't say that I'm happy about them, either. Barring Agnes praying up a miracle, we're faced with three options. We can have children and watch them die. We can choose not to have children. Or we can see if Andy's modification idea will actually work, in which case we're going to have to come to terms with the idea that we'll have children who aren't entirely like us."

"I don't know if I could love a child who wasn't human," Catherine whispered.

"Not human?" Lalo repeated thoughtfully. He was silent a moment, then said, "I'll bet the first time the kid smiles at you, your heart will melt. You won't be able to help yourself."

It wasn't until later that he realized he'd already made up his mind.

But there was a large difference between Lalo making up his own mind and the decisions of others. He went to see Andy again. Then he dropped by the cabin where Wilson Staunton lived. Then he sat down and had the first of a series of long talks with his wife.

In the meantime, Agnes Beeson had called the members of her prayer group together. It soon became clear that they looked upon others as not doing their part by joining their group. This led to small frictions. Over time, the problems increased in size and frequency to point where they were being brought up in the community meetings.

Late one afternoon, a storm developed that made it to within sight of land, but dissipated before it could bring them any rain. Agnes and the other members of her prayer group were positively gleeful, openly taking credit for having brought the storm within sight of the colony. However, the fact that it didn't actually rain, coupled with the fact that months passed without further developments only tended to further polarize the colonists.

For a surprisingly long while, no one noticed that Catherine Helsink's clothes were getting tighter around the middle.

Late on a hot, windy Wednesday night a girl was born. They named her Hope.

Three weeks later, the Helsinks were taking a brief, leisurely stroll, ambling through the streets of the little town, enjoying the evening air. Hope was peering myopically up at her mother's face, making little bubbling noises. Catherine was tracing gentle lines on the child's face with her fingertip.

"Evening, folks," Wilson Staunton said. He was seated in a chair leaned back against the front wall of his cabin. "How's the little 'un?"

"All you could ask for," Lalo replied proudly.

"She's absolutely beautiful," Catherine said, diverting into Wilson's front yard, leaving Lalo to follow after. "I think she's going to look like my grandmother."

Wilson looked the child over approvingly. "Well, now, isn't that just the proper little girl?"

"Is that the child?" came a voice from behind them. "Can I see?"

"Good evening, Agnes," Wilson said. "Yep, looks like the Helsinks have gone and hatched that little kid that Catherine's been carrying these past few months."

Agnes Beeson came and peered closely at Hope. "And all this time I was worried. Why, look at her, she's just beautiful!" She looked up at the Helsinks with an earnest expression. "Oh, I'm so glad you didn't do any of those beastly things that Andy was talking about. That would have been *so* unfortunate. Now look at her. She's just perfect."

Lalo took a deep breath. "Actually, Agnes, we did have her genes modified."

"Oh, listen to you! Such a wag! No one could produce such a beautiful baby as this except God."

"Andy created our child, Agnes. He made her using our gametes, but he gave her salt glands."

Agnes stopped cooing over the baby, her face frozen. "You don't mean . . . you didn't . . . what are you saying?" She turned back to the child, staring, seemingly searching to see if Hope had suddenly developed horns and cloven feet.

"I'm saying that she'll inherit this world with the ability to drink salt water," he said evenly.

"That . . . that child is an abomination. She's nothing more than an experimental *animal!*" She held her hands up, staring at them as though she had been contaminated by the merest touch of the baby's skin. "Why, I—"

"Agnes, stop it," Catherine said quietly. "You're upsetting her."

"Upsetting her? Why, that's quite remarkable, Catherine! I'd say that you've quite gone beyond yourself, taking God's—"

"*Agnes!* That's enough!" Wilson said sharply.

Her mouth shut with an audible snap. With narrowed eyes, she glared at Wilson, then at the Helsinks, and turned on her heel.

As she stalked away, Wilson observed, "Folks, I may not be the sharpest knife in the drawer, but I think I can safely say that she's a little peeved."

Lalo, nodding slowly, watched Agnes depart. "I think you're right, Wilson."

Over the course of the next year, three more children were born with salt glands. One was born without. Aside from the salt tracks on their faces, there was no observable difference that could not be attributed to the usual variations from parent to child. However, the modified children were regarded by some of the adults as being different from the "normal" children in a deeper, more fundamental way. The term "salties" began to be heard in some corners.

Wilson Staunton had been re-elected almost against his will. Almost. Grudgingly, he was beginning to admit that he liked being the mayor of the colony. Sometimes. Other times it was less satisfying. Like during some of the town meetings, for instance.

"All right, all right, that's enough," Wilson rumbled. "Dick, make up a committee to look into the pet thing. Everybody's got to agree on one kind of animal. Just one. Can't have Andy's time taken up building one cat, one dog, one canary, one hamster, one . . ." he waved his hand vaguely in the air, "whatever. He's got more important things to do. Also, you'll need to figure out what they'll eat. Try to go with something that can live off of table scraps, 'cause I don't want us having to use what little water we've got growing something specifically for somebody's pet to eat."

"*Tying them up in committee again?*" Pete Davis teased from the front row.

"Hope so. It won't take 'em but five minutes to make up a list of critters, but it'll take 'em five years to decide on just one. By then we'll either have this water problem licked or we'll be dead." Grinning wickedly, he turned and added, "Oh, and Dick? Make sure that there's someone willing to be a veterinarian. Can't have pets if there's no doctor to fix 'em when they break. No vets, no pets. Okay?"

Dick sighed dejectedly. "Any other straws you want to toss on my back?"

"Not at the moment, but I'm sure I'll think of something." He stopped, frowning. "Wait a second, Dick, I may have jumped too far, too fast. Andy, is there any reason you can't give an animal salt glands?"

Andy stood up from where he was seated next to Lisa Mullens. "Uh, no. Shouldn't be any problem."

Staunton nodded. "Thanks. Okay, Dick, carry on. I was worried for a moment there. If we were to have to let a bunch of dogs and cats and such into our water supply, I was afraid I'd have to veto the project, but if Andy says he can do it, then go ahead."

"Wilson!"

"Yes, Agnes," he groaned.

"I want this stopped this instant," she demanded.

"You want what stopped, Agnes? The pet thing? Tell it to Dick. He's been appointed the pet czar." He pointedly ignored the horrified look he was receiving from Dick's direction. "If you can talk him out of having a batch of pets made up, then it's no skin off my nose."

"You know very well what I'm talking about, Wilson Staunton. It's against the will of God for Andy to be creating these creatures. If God had wanted there to be dogs here, He would have put them here."

Wilson rubbed his jaw. "Agnes, if God had wanted ***humans*** to be here, he'd have put them here. Now, judging from the fact that we haven't seen any, I reckon that means we ain't supposed to be here. Care to comment?"

She huffed indignantly, but said nothing.

He continued, "You know, Agnes, I read the Bible once. Now, my memory ain't what it used to be, but I don't remember there being anything in there about letting Andy give some kid a pet dog. Now, can you cite me a chapter and verse that I missed? If not, then honestly I'm a little unclear how it is that Andy's work is against the will of God."

Agnes gaped. "*Wilson Staunton!* Of all the disrespectful things to say!"

"Agnes, I know very well how you feel about Andy's work—hell, we all know by now how you feel, but the wells are giving us less and less, and Lisa's stills aren't breaking even with the drop in the well production. In the eighteen months since Andy first did his little magic trick, no one else has managed to come up with a better idea. Now, if you've got something to offer, we're listening."

"Well, like I've always said, if we would all simply pray, I'm sure that God would hear our prayers and things would be put right. As things stand now, I'm sure he's punishing us for our sins. We need to submit ourselves to the will of God and—"

"Agnes. Please. We don't need a sermon. And I'd like to point out that the drought began long before Andy began producing salties." He paused, looking embarrassed. "*Ahem* . . . sorry, folks, that just kinda slipped out."

"Wilson Staunton, don't you ignore me," Agnes said, her voice low. "I'm done trying to reason with you. Don't let any more of these abominations come into being."

They locked eyes for a long moment before Wilson said, "Agnes, as I've said before, I'm not entirely comfortable with the idea myself, but it seems to be working out. Now, if you'll excuse me, we still have several items on the agenda for tonight, and I'd like to get to them so that we can all get out of here at a reasonable hour."

"Is one of those items Baranain?"

"Shut up, Thomas."

Catherine Helsink rolled over in bed, rubbed her nose, and snuggled back into her pillow.

But there was a faint sound.

She listened, wondering if it was Hope. No, it didn't sound right. She listened more carefully, wondering what it was. After a minute passed, she still couldn't identify it and, worried that Hope was awake, she slipped out of bed.

But as she passed by a window, she saw light. Glancing outside, she froze for a moment, then screamed, "Lalo! *Lalo!* Get up!"

"What's wrong, babe?" he asked, groggy.

"Get up. The Andersons' house is on fire."

"*What?*" But he was already in motion, reaching for his pants. "There's not going to be any way to put out the fire. We don't have enough water. But we might be able to salvage some things if we work quickly enough."

Catherine caught him by his arm. "Honey, be careful. Don't do anything dangerous."

He kissed her on top of her head. "I'll be careful," he promised. "You stay here and keep an eye on Hope. Can't take her over there, but we can't leave her alone, either." Seconds later, he was out the door, still buttoning his shirt.

Catherine stood by the window with Hope in her arms, watching. She could see the silhouettes of figures moving back and forth. Moments later, she recognized Lalo's by the way he moved. Without realizing it, she began crying, watching helplessly as the Andersons' lives changed forever. She could only hope that they and their baby had gotten out safely.

A muted *whoomf!* at the back of the cabin caught her attention. She turned to see flames through a window. For precious seconds, her mind went blank, denying what she was seeing. But the flames didn't stop, and her reflexes kicked in before her mind did. Instinctively, she ran to Hope's bed, whipped the blanket off and wrapped it around the sleepy child in her arms.

Hope whimpered, confused by all this late night activity.

"Hush, honey, it's all right. We're just going outside for a minute."

She quickly made her way to the front door, trying desperately to think of what she should take with her, but it was everything or nothing and there wasn't enough time. Yanking the front door open, she ran, screaming, "*Lalo! Lalo!*" She made it half-way to the Anderson's cabin before she found him, sweaty and sooty, coming her way. Others were following. "Our house!" she cried. "Our house is burning!"

He cursed and pushed past her. The entire back wall of their cabin was engulfed in flames. He ran for the front door, reappearing moments later with his arms full of clothing. Moments later, a shout went up and a number of people rushed off. Two . . . then three more houses were burning, one after another.

A short while later, Lalo, Catherine, and Hope were left alone in their front yard, watching the remains of their home burn to the ground. "Arson," Lalo said, his voice cracked and raw. "Someone did this on purpose."

Remembering the sound of the fire starting, Catherine nodded numbly, as much to herself as to him. "Someone should tell Wilson," she said quietly as the west wall fell into the flames, sending up a shower of sparks.

Lalo sighed. "If Wilson can't figure this out for himself, then there's no point in telling him. This many houses don't catch fire in the same night by accident."

"But why would anyone want to burn our houses down?" Catherine demanded, tears streaking her cheeks. "Why?"

Lalo reached out and touched Hope's little button nose, leaving a sooty smudge. "Think about the houses that burned. Think about the children who lived in those—"

"They're all modified! And Francine was pregnant!" Catherine gasped. She clutched Hope closer. "But that means that someone tried to kill our daughter."

He nodded, exhausted. "It's time to go."

"But where?"

His eyes looked haunted in the flickering light from the flames. "Anywhere but here. And quickly."

Al Tilson stood gazing sadly at what remained of the Andersons' cabin. Lacking water, the colonists had used dirt to try to smother the flames. The ground around the still-smoking ruins was pocked with small holes where men had attacked the drought-hardened soil with shovels in their vain attempt to stop the fire. The Andersons' yard looked as though it had been peppered with artillery fire. In combination with the blackened timbers and the thin wisps of smoke, it looked like a battlefield.

In a very literal sense, that's exactly what it was.

Tilson saw a melted spoon curled against a stone. He lived on the outskirts of town and had arrived too late to do any good. Not that any of the burning houses had been saved, but he'd have liked to try.

A small flame flickered to life, a hot spot that hadn't been completely extinguished the night before. Without thinking, he stepped through the ashes and rubble and crushed it out with the sole of his boot.

He looked up to see Agnes Beeson watching him. He gestured at the devastation. "And you're glad, I assume."

Her face was haughty. "They had it coming."

He picked his way across to where she was standing and stood glowering down at her. "Agnes, two people died last night. That's nothing to rejoice about."

"They were wrong to do what they did."

"I don't suppose you remember the part about 'Vengeance is mine,' do you? Whose name came after that . . . yours or God's?"

Her eyes narrowed. "Don't you dare preach to me, Al Tilson!"

"You're contemptible, Agnes. You react out of hatred and fear, then call it religion. That's not what religion is supposed to be about."

"And I suppose it's about setting man's judgment above God's? What these people were doing was wrong! They were setting themselves up to make decisions that were not theirs to make. You, of course, don't want to see that."

"In the not so very far distant future,

we're going to have to make some decisions ourselves. I'm not so blind that I can't see that. The problem is that none of our other options seem to be sufficient to meet the problem. You, in your pride and arrogance, have run off the only people who had a workable solution."

"We need to be praying for rain. That's our salvation. Our *only* salvation."

Tilson leaned back and studied the cloudless sky for a moment, then he looked back down at Agnes. "Doesn't seem to be working, does it?"

"*Prayer works!*" she insisted.

"So you're of the mind that God's got to do it all."

She nodded vigorously. "Yes. Exactly."

He looked at her, his eyes full of pity. "There's an old saying that 'God helps those who help themselves.' I'd rather take the chance that I *might* be wrong about genetic engineering, rather than *know* I'm wrong if I disobey the Commandment that says 'Thou shalt not kill.'"

He shook his head. "You've gone too far, Agnes. Much too far."

Lalo Helsink stood looking towards the sea, visible in the far distance. He was burned brown from many days of laboring in the sun, and his muscles were hard. He heard footsteps behind him and turned. "Wilson? What are you doing here?" he asked.

Wilson Staunton smiled sourly. "I've come up here to live with you folks if you'll have me. I've got a peace offering."

"As far as I know, you don't need to make a peace offering, Wilson. I never suspected you of doing anything against us."

Wilson shook his head. "I didn't. But I didn't do enough to stop it either. We knew that they were up to something, but it never dawned on me that they'd go as far as they did. That was my failure. I should have pressed harder, somehow."

"But you don't have anything to fear from them—you don't have any modified children. Why would you want to live with us?" Lalo asked.

"It was obviously arson, right? The first thing I did was start investigating. And . . . well, the thing is, there were lots of them, Lalo. I was prepared to deal with two or three people. Maybe five at the outside. But once I started digging, it turned out that there were more like twenty or thirty in on it, and many, many more who supported their actions. Out of seven hundred and fifty people, we've got maybe a third who feel that torching someone's house is an acceptable way to get across the message that you don't agree with them. Two people died that night, and they act as though it was justifiable in some manner. That's a big enough problem that I just didn't see a way to handle it. Now, I may or may not approve of the genetic modifications, but I'm not so blind that I can't see that this is the only real option we've got if we intend to survive as a species on this planet."

"But what about the people who're still in town?"

Wilson shook his head angrily. "They're smug. They openly brag about running you folks off. They think you'll die miserably out here in the wilderness. But the thing is that they're the ones who are doomed. Yes, they've got the wells and the stills, but that won't last forever, and they refuse to see that—they think that if they just pray hard enough, that the rain will come back." He shrugged. "Maybe it will, maybe it won't, but there's no sign of it yet. Agnes said that your day of reckoning had arrived. Well, perhaps so. But theirs is coming, and it's going to be far more tragic than yours." He looked up at Lalo. "I don't want to live with people like that."

Lalo kicked the dirt at his feet. "I'm not sure how much future we've got, Wilson. We've got three springs that give us a bit of water, but we've got less than fifty people, and of those only nine are children. That's not enough to prevent inbreeding. And Andy lost everything. Someone burned his lab, so there won't be any more modified children—just the nine."

A slow smile crossed Wilson's face. "Ahh . . . funny you should mention Andy's lab."

"What about it?"

Wilson chuckled. "You might have noticed that I wasn't at any of the fires that night."

Lalo frowned, thinking back. "So? Lots of people weren't there."

"Well, I wasn't. You see, once I saw the fires, it was obvious that Andy was on the list, too. Once I checked to make sure that he was safe—he was with you folks trying to help put out the fires—I went and kinda broke into his lab and started carrying things out as fast as I could move. Stuffed it into the back of my cabin on the sly. All that equipment is safe. And as long as we're quiet about it, we can sneak into town tonight and bring it all up here."

"You're saying that Andy's lab was *empty* when they torched it?" Lalo demanded, incredulous.

Wilson nodded, eyes twinkling. "Yup. Near enough. Backed my truck up and filled it. Some of it was heavy, but I'm a big man. From having watched Andy, I don't think there were but three or four things that were essential. I got all those and a few other things that looked nice and complicated. It'll be up to Andy to say for sure, but I think I got all the things he'll need."

And Lalo Helsink began to laugh, and once he started he couldn't stop. Before long, Wilson joined in and it was quite some time before they got themselves under control. Wiping a tear from his eye and gasping for breath, Lalo finally said, "Well, I must say, Wilson, you've managed to surprise me."

"I kinda figured that you'd like that part. That's why I saved my peace offering for last. You people are the only hope for the future here. I'd hate to see that opportunity get lost."

Lalo, still chuckling, nodded his head towards the little grouping of huts on the slopes of the valley behind them and said, "Let's go tell the others."

"You don't think they'll shoot me on sight?" Wilson asked, looking worried.

Lalo shook his head. "No, in fact I think you've just earned another term as mayor."

Wilson grunted in mock dismay as he fell in beside Helsink. "Now, don't go talking like that, son. I wasn't talking about running for office again."

"I don't think you'll have a choice," Lalo said, grinning. ■

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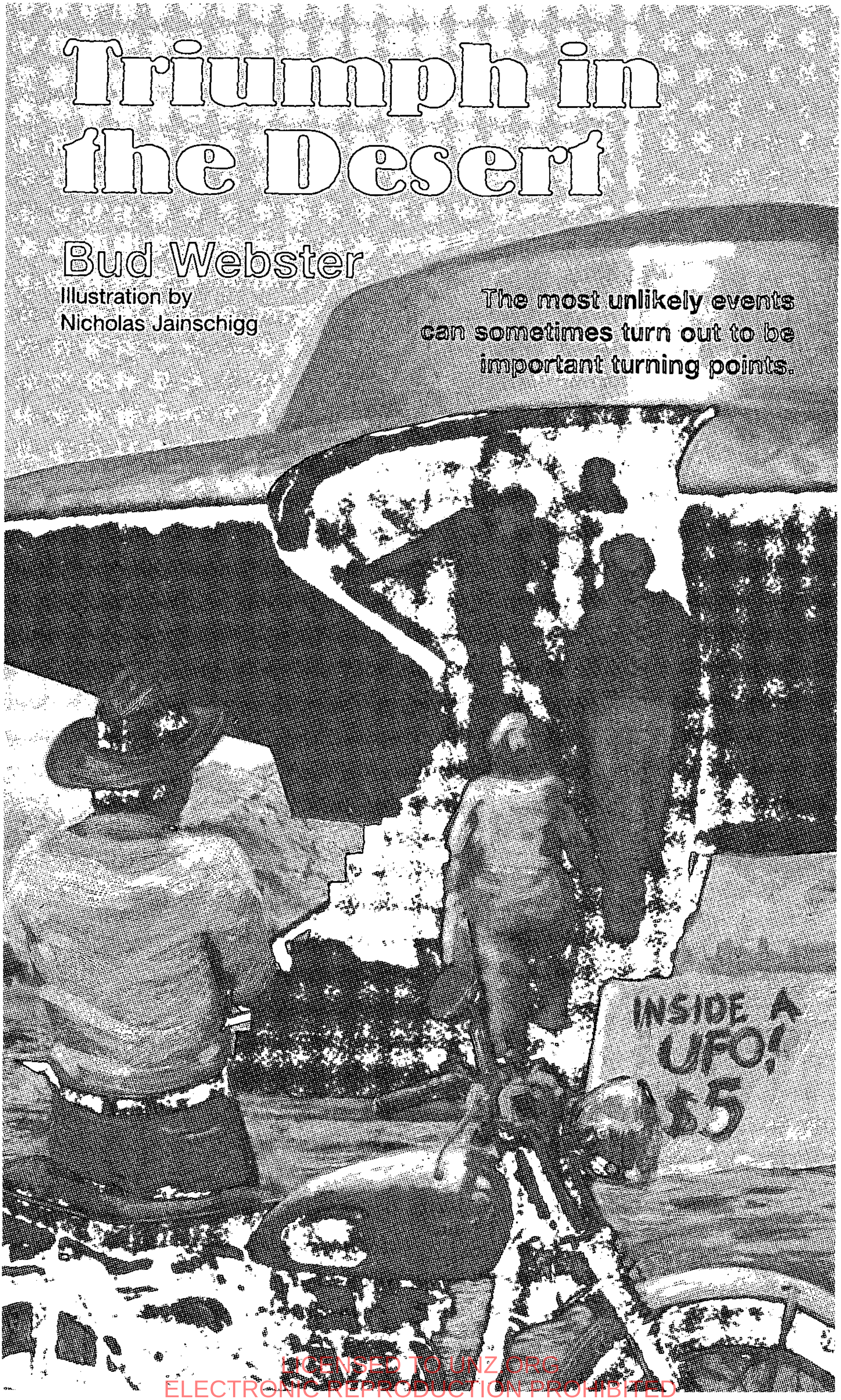
Triumph in the Desert

Bud Webster

Illustration by
Nicholas Jainschigg

The most unlikely events can sometimes turn out to be important turning points.



“THIS WAY TO THE 1958 GIANT ROCK SPACE CONVENTION,” the sign shouted in badly stenciled letters (the “S” in “SPACE” was backwards) with an arrow pointing up. It was painted on Masonite and nailed to a stake stuck deep in the sand next to Route 247.

Hudge planted his feet on either side of the big motorcycle, its engine purring quietly despite the desert heat, and pushed his goggles up on his forehead.

“Yeah, well, which way's up?” he muttered to himself. It wouldn't matter, more than likely, since a space convention couldn't be but just so hard to find out here. “I guess I just look for the Giant Rock. Hey, you!” he called to a lizard sunning itself on a stone. “Any idea where this Giant Rock might be?” Startled, the lizard leapt away with a flick of its tail. “Stupid question, I guess,” the boy continued. “*Most* of the rocks around here are giant, far as you're concerned.”

A loud blatting in the sky above and behind him caught his attention; a small, high-wing aircraft dropped over a high ridge, engine straining as it fought the rising air currents to the desert floor. Since this Space Convention was being held at an airstrip, Hudge adjusted his direction accordingly.

Moments later, he was staring over the ridge at the desert below. “Holy cow!” he said under his breath. It was, in fact, a *very* big rock, easily seventy feet high and covering several thousand square feet.

It's hard to judge distance in the desert, but it still looked as though he had a few more miles to go before he reached the site. He could see cars, trucks, silvery trailers that looked like something out of a Flash Gordon serial, and dozens of aircraft of every sort: Pipers, like the one that had passed over-head; low-wing Aeroncas; bi-planes that could have been either Boeing Steermans or Waco UPF7s, and . . . what the heck? Was that an *autogyro*?

Hudge shook his head wryly. What kind of idiot would fly one of *those* in the desert in June? It was bad enough taking a motorcycle through this heat, much less something that would shake like Jell-O if you sneezed. There were even a few other motorcycles down there, although he was too far away to see what they were. Settling his denim jacket on his shoulders, he steered the bike over the ridge.

Edgar Allan Poe Hudgins Pritchert—“Hudge” to his friends—was in the middle of the Mojave Desert a few weeks shy of his sixteenth birthday. He'd come a long way in three months, and not just in miles; three months ago, he'd still been in Virginia. Three months ago, he'd been a sophomore at Martinsville High. Three months ago, he'd still lived in his father's house, still had a family, still had a future. Now, all he had left was a beat-to-crap motorcycle and a worn Boy Scout backpack that bulged and creaked where it sat strapped to the back seat.

He stretched his legs on either side of the bike, digging the heels of his engineer boots into the sand to keep him steady as he rolled down the ridge. He steered for the parking lot on the far side of the air-strip, trying to divide his attention between his path and the spectacle below him.

There were *thousands* of people milling around or standing in small groups down here. He could see a platform set up against the Rock, loudspeakers on either side, and not far from the parking lot, folks were huddled around tables loaded with he-didn't-know-what-all.

As he got to the parking lot, the ground smoothed out, and he could move more confidently. Station wagons seemed to predominate, but he saw a few roadsters and coupes as well. There was even a Crosley that *had* to have belonged to the autogyro pilot's idiot brother. He shook his head. He didn't want to think about what ramming the desert roads was like in that thing. Crosley may have made pretty good refrigerators, and that squat, ugly little car may have been the closest thing America had to the German Volkswagen, but the fact was that Crosley didn't have Porsche working for them. Crosleys and autogyros, *he thought to himself.* Fringe element or not, he'd expected these folks to have more sense.

He was moving slowly between the parked cars looking for a likely place to put his bike, when he saw a very tall, lean man bent over an even bigger motorcycle and muttering under his breath.

"Afternoon, sir," Hudge called out as he stopped his bike. He swung his leg over the seat and pulled the motorcycle up on its kickstand. "Having trouble?"

The tall man stood slowly, wiping his hands on new-looking jeans. "Yes, please. I have a broken chain, and no way to repair it. Do you have tools by any chance?" He spoke English idiomatically, but with a soft accent Hudge couldn't place.

"Let me see what I can do." He hunkered down to look at the motorcycle, a 500cc BSA Gold Star. "Yes sir, it's broke clean through. Looks like you hit a rock or something on the road."

"Yes, I did hear a loud noise a short time ago. I was able to coast this far, but I can't go further without a replacement, and I don't have one. Nor," he continued with a lopsided grin, "am I confident that I'm going to find one among our saucer-seeking compatriots."

"Doubtless not. Well, British sprockets are pretty much British sprockets. I do have a spare chain, and I think I can fix what you've got 'til you can get to a garage to get a new one."

"You'd do this for a stranger?"

"Oh, yes, sir. Who better for?"

Hudge opened his pack and dug for his tool-roll. Spreading it out on the ground, he chose an odd-looking tool and swiftly removed the broken links. Laying them carefully aside, he replaced them with a master link.

He looked up at the tall man. "Now, here's where it gets tricky. Don't do any good to fix the chain if the tension's wrong." He began to rotate the rear wheel slowly, stopping when he found the least slack. "See here? If these sprockets were any good at all, the tension'd be *even all the way around.*" The boy shook his head. "Only thing worse is the electrical system."

"Yes, I know," the tall man answered with a straight face. "I carry a flask of holy water with me when I ride. Sometimes it's the only thing that helps."

Hudge looked up at the man and laughed. "Gotta work better than anything I've tried." He bent back to the chain.

Reaching for the only adjustable wrench visible in the little kit, he backed off the rear axle nuts. Once they were loose enough, he carefully eased the chain-adjusting nuts, counting the turns on each one, to find the correct tension.

"See right here, sir?" He pointed to the chain when he was done. "You got just about an inch of play up and down. Any more or less and you'll eat another chain."

"Yes, I see. Thank you, young man."

"Perfectly welcome, sir. I was happy to do it." Hudge finished tightening down the nuts as he spoke.

"How can I compensate you for your time and effort?"

Hudge stood, wiping his hands on a clean rag, and shook his head. "Oh, please don't worry yourself about it, sir. I was raised right." He frowned momentarily, then added, "Mostly. Anyway, I love to fool with machinery, and you needed the help."

"Ah. I love machinery too, but I have little capacity for 'fooling' with it, as you say." He held out his hand to the boy. "I'm Pieter de Waal, retired electronics engineer from Holland."

"Hudge Pritchert, sir, unemployed shade-tree mechanic from the Commonwealth of Virginia. I'm pleased to make your acquaintance." They shook hands in the desert sunshine and smiled at each other, then turned to walk to the area where most of the people were gathered.

"So," de Waal asked as they walked, "what brings you here?"

"Oh, I suspect the same thing that's brought everyone else, Mr. de Waal." He gestured with his hand to indicate the crowd. "I've read a lot of the books about flying saucers, and I was on my way to North Beach, so this wasn't too much of a detour."

"North Beach? And what might be there?"

"Well, I don't know exactly. See, I just read this book, *On the Road,* by a guy named Ker-OW-ac, and I wanted to see what it was really like. The Road, I mean. So I left Virginia and headed West, just me and my thumb." He laughed. "You might say I'm gettin' my kicks on Route 66."

"You hitchhiked? But you've got a motorcycle, a Triumph."

"That came later, Mr. de Waal." They were passing small knots of people now, heading for the stage where a small, sweating man was holding forth about something they couldn't quite make out.

"I thumbed rides and walked, even hopped a few freight trains, and wherever I lit I'd ask around the gas stations and garages for some work." He was a little reticent about saying too much to this man; he seemed to be okay, but Hudge had a Southerner's inborn reluctance to completely open up to a stranger. Nevertheless, the tall man was easy to talk to.

"I found myself in a little town in Wisconsin called Amherst. A guy there named Marshall had a Flying-A service station and gave me a job. Said he couldn't pay me much, but if I helped him rebuild some truck engines I could sleep at his house and he'd feed me." He smiled at the memory. "His mother made terrific pies. I must have gained ten pounds while I was there." They were passing tables stacked with books and pamphlets, which he looked over eagerly.

"As work goes, it was pretty good. I like working with my hands, and his wife was a good cook, too." He laughed. "The both of them kept after me to stay in town, but nice as it was, there were other places I wanted to go. She kept trying to set me up with her nieces, but I knew I'd be leaving in a few weeks or so, and I didn't want to take a chance on having to leave someone I didn't want to." He looked grim. "I've done enough of that to last me a lifetime."

"And they told you about this conference?" de Waal asked.

"Not them, no sir. I was in this bookshop on what passed for the main drag, and I met this little guy who was bringing in copies of a magazine he did about psychic stuff. Turned out to be Ray Palmer."

"Ah, yes," de Waal nodded. "I'm aware of Mr. Palmer's work."

"Well, that's more than I was. Anyway, he told me about this little gathering, and I figured it wouldn't take me too far out of my way. Marshall was happy enough with what I was doing for him that he gave me that old bike back there, and loaned me the tools to make it street-legal. Took some doing," he added, "but it was worth it. No more hitching, no more freights. I suspect my kidneys will never forgive me, but I try to keep to the highways, so it doesn't bother me too much."

"I see. But you're awfully young, aren't you?"

"Yes, sir, I'll be sixteen this July."

"So young, and so far from home? I'd have thought that your parents—"

"Hey!" Hudge exclaimed as he picked up an amateurishly printed and stapled booklet titled *Flying Saucer Revelations*. "I heard about this, but I haven't been able to find a copy." He peered at the dealer behind the table, a pale man wearing sunglasses, an eye-shade, and a noseful of zinc oxide. "'Scuse me, but do you have anything about the Bender Mystery?"

"Nah," the man replied, "just what you see, kid."

Hudge pulled out his wallet and handed the man two worn dollar bills and some change, then stuck the booklet in his pack.

"'Bender Mystery?'" de Waal asked. "What's that?"

"'The Men in Black,'" Hudge replied. "No such thing, of course, but it's a cool idea."

de Waal looked at him quizzically. "'Men in black?'"

"Yep," Hudge replied. "Not that there's any mystery about it, really." He shook his head. "People in black cars wearing black suits threatening other people who've reported sightings. Bender seems to think they might not be human. Robots, maybe." He chuckled ironically. "I think he just needed an excuse for not getting his newsletter out on time."

"But why threaten those who report UFOs? What would they gain?"

"Who knows? There's a lot of paranoia around these days. Some people think the government is covering up all kinds of sightings and landings and such."

"And you don't agree?"

"Well, I think it's giving the government a lot more credit than it's earned, Mr. de Waal."

"Please, call me Pieter. You may be right. I suppose I understand why some people think so, but it's not a terribly comforting thought."

"Nope. Once you start thinking that your own elected officials are keeping stuff from you, it's way too easy to suspect them of anything and everything. Oh," he added, kicking at a rock in the sand, "I don't think for a minute that they're telling us everything they know, but the kind of conspiracy people are accusing them of is just silly. Shoot, I figure you can't get three government people to agree on where to eat lunch, let alone keep *that* kind of secret." They both laughed.

"So, how about you?" Hudge asked. "What brings you to the Mojave in the summertime?"

"I attend quite a few of these gatherings. Although I'm retired, I still do consulting work sometimes. In this case, I've been hired as a, well, a recruiter, you might say. I'm looking for special kinds of people, people with talents and abilities that would suit my employers' needs." He shrugged. "I've had very little luck so far."

"Well, if you're looking for sheer unadulterated nerve, completely unconnected to intelligence, just look for the guy who flew here in that autogyro."

de Waal laughed. "Oh, no. He'd be the *last* on my list."

As they came to the end of the row of tables, they heard voices raised in disagreement.

"No, no, *no!*" A short, thin woman was saying emphatically, waving her hands up and down at an overweight man. "You don't have the faintest idea what you're talking about."

"Dear lady," the tone of the large man's words made it clear that he thought she was neither. "I have been to Venus on numerous occasions. I have spoken of these visits before government scientists and heads of state. In Europe, I *saloned* with nobility." He paused, gathering himself up to his full height. "I am a noted authority on the planet Venus, and I know whereof I speak. Venus has a perfectly lovely climate."

"Well, you may very well *believe* you've been to Venus, you pompous ass, but . . ."

"I assure you that Venus is as temperate as Southern California," the man interrupted. "At no time was I subjected to anything worse than a mild shower—which, I will point out, was engineered by the Venusian scientists." He sneered.

"Now, I don't know what planet *you* were on, but I assure you . . ."

"Oh, horse-shit!" the woman exploded. "I know for a fact that Venus is covered in swamps! How you can stand there and say . . ."

"Here, here," de Waal said placatingly. "What's the difficulty? Why are you shouting?"

"I'm not at all sure that it's any of your business," the big man said, nostrils flaring.

"If you really must know," the woman sniffed, pointing to the overweight man. "This . . . fraud as much as called me a liar!"

"I was merely trying to point out . . ."

"You were implying that I was a fake!"

Hudge spoke up politely. "Excuse me, ma'am?"

"What?" she snapped.

"I don't mean to intrude, but I don't like to see people fight over unimportant things."

The large man flared his nostrils even more. "Unimportant? This . . . woman accuses me of lying, and you think that's unimportant?"

"Oh, no sir, not that. What I mean is . . . well, let me ask you both something: where are we now?"

"We're in the desert, you young idiot!" the woman said angrily.

"Right. And where were you, say, two days ago?"

She stared at him. "I was in Oregon. Portland."

"And I was at Vero beach, in Florida," the big man said with impatience. "Although I can't see . . ."

"Hot and dry in either place, was it?"

The woman grudged him a smile. "No, it was not. I think I see what you mean, son, and I apologize for my hasty words."

"That's quite all right, ma'am." He turned to the heavy man. "Do you understand, sir?"

"Yes, I think so. You're saying, in effect, that I may have visited Venus's temperate zone, while she was, say, at the equator."

Hudge beamed. "Yes sir, that's it exactly."

"Yes. Well. I suppose . . . it's possible."

The man and woman smiled icily at each other, and went their separate ways.

Hudge sighed. "It's all 'horse-shit,' Pieter, if you'll pardon my French."

"Yes, of course I will, but why do you say so, Hudge?"

"Because neither one of 'em has ever been to the planet Venus, that's why." He shook his head ruefully.

de Waal cocked his head. "How do you know?"

"Well, for one thing, we've known for about twenty years that the surface temperature of Venus was way too hot for comfort, somewhere around 275 degrees."

de Waal nodded slowly. "Yes, I believe I'd have trouble being comfortable at that temperature."

"Right. But it gets worse. Earlier this year, some scientists bounced microwaves off the planet and got back temperatures upwards of twice that." He shrugged. "So, *quod est demonstrandum*. Even given that there are flying saucers, given that these two had met up with the aliens flying 'em, and given that they'd both somehow hitched rides along with 'em, if they'd been on the surface unprotected, they'd be dead. Ergo, they weren't there at all."

The older man nodded. "I think you're right, but what does it mean?"

"Well," Hudge said with a sigh, "they're either lying or deluded, to be blunt. And I don't much care for either option, really." He hitched irritably at his pack. "Not that that's the worst of it." He looked at de Waal. "Have you ever fooled around with a camera? A real one, I mean, not a Brownie."

"Yes, I have a Leica 35mm camera at home."

"Ever point it at the sun, or a very bright light and get a lens flare?" de Waal nodded.

"Well, look in almost any of those books over there, and you'll see a bad picture of a lens flare, and the guy who wrote that book will swear up and down that it's a flying saucer." He snorted. "Any high-school camera club kid knows what it is, but not the people who wrote those books. Either that, or they're deliberately lying about it."

"Hudge, you're an intelligent young man, aren't you?"

The boy didn't answer for a moment. "Well, I try to be."

de Waal shook his head. "No, don't make light of yourself. You've shown an extraordinary intellect for someone your age."

Hudge looked down at his feet in embarrassment and shrugged. "Yeah, well, I guess my folks are pretty smart, too."

"And you've come a very long way for reasons of your own, even if this is a . . . a side-journey?"

"'Side-trip.' Yes."

"What did you expect to find *here*, in the desert?"

Hudge spoke slowly, as if testing the words. "I don't really know, Pieter. Well, I know what I *wanted* to find."

"And that is. . . ?"

The boy looked around him at the people, unified by common beliefs if not experiences, and waved a hand to take it all in.

"I guess I'm looking for the truth, Pieter. Y'see," he went on in a rush, anxious to put his thoughts into words, "as long as I can remember, I wanted to know that there was life out there. Not just believe, but *know*, right down to the soles of my shoes. I want to hold in my hands evidence—any evidence—that will convince me beyond a shadow of a doubt that it's *real*, that we aren't alone."

"But all those books, the films, photographs . . ."

Hudge waved this away. "But it's not *proof*, Pieter. Look, anybody can fake a photograph, or point their camera at something they can't explain and claim it's a flying saucer. Anybody can say they've been to Venus, or Mars, or even Procyon, for that matter. It's no different from a country preacher on the circuit, ranting and raving about visions of the apocalypse."

"You're talking about faith," de Waal said.

"I guess I am. I guess maybe I am. But I'm a mechanic, Pieter. I believe in—I *have faith* in—what I can hold in my hands. And this stuff . . ." again, he waved his hands to encompass the crowd and the reason they were gathered, ". . . is like trying to pick up water with a fork, or nailing Jell-O to the wall." He looked around them, frowning as he spoke. "Their faith is no different from some religious guy's, you know. Used to be people believed in angels. Then we dropped the Bomb, and Russia dropped one, and the British have one now, too. I guess all those bombs killed the angels. Now all we have is aliens, the 'Space Brothers,' who will save us from blowing ourselves all the way up." He looked grim. "At least, that's what *they* believe, all these . . . flying saucer nuts."

"And that saddens you, doesn't it?"

Hudge sighed. "Yeah, it saddens me, and it frustrates me, and it angers me. In a way," he continued, "the worst thing about it is they don't have any *imagination*. Lens flares. Venus with an Earth-like climate. Do they really think that what they say life is like out there can *possibly* be more wonderful than it almost certainly is?"

de Waal nodded to himself. "Yes. I see your meaning. But, hey," he said, more brightly, "it's late in the day, and I don't know about you, but I'm certainly hungry. There's a café under that Giant Rock, and I'd be delighted to buy you a meal."

"Make it a greasy burger and some limp fries, and you got a deal."

"Done, then."

"'Hudge.' This is an unusual name, even for an American," Pieter said as they ate and sipped iced tea in the relative cool of the café.

"I suppose it is at that. It's short for my full name, Edgar Allan Poe Hudgins Pritchert."

"My word, that *is* a mouthful! I can understand why you shortened it."

"My little sister, Alice, calls me 'Bubba,' but that's because she couldn't say the word 'brother' when she was little. Bubba's okay as a nickname, I guess," he went on, "but the guys at the racetrack call me Hudge. My folks," he added ruefully, "call me Allan."

"Racetrack?" Pieter asked. "You worked with horses?"

"Not that kind of racetrack. This was the Martinsville Speedway, the best paved track in the state. Shoot, for a while, it was the *only* paved track in the state."

"And you made your living by working there?"

"No, sir. At least, not for pay. I didn't have to do that." Hudge swirled what was left of his iced tea. "My family is rich, y'see. Probably the richest family in Martinsville. One of the richest in Virginia." He began to draw circles in the water on the tabletop.

"Dad owns some textile mills. Back in World War II, he landed a contract to supply the armed forces with silk for parachutes, as well as cotton for uniforms. He got pretty much the same contract for the Korean War, too."

"Government contracts can be very lucrative," Pieter said, nodding. "My old firm made communications equipment."

"Right. Dad was pretty damn proud of what he'd built over the years, and he couldn't wait for me to come into the business." Hudge shook his head. "He just couldn't understand why I didn't want to."

"Ah," de Waal said. "That must have caused conflict."

"Yeah, well, I'd have to say that 'conflict' was something of an understatement, Pieter. We 'conflicted' all the time about it." Hudge tipped back his iced tea and finished it off. "I don't know. If he'd let me work on the looms . . . I used to love those machines, all the linkages and belts, and the noise, and I'd spend hours on the mill floor just watching them run. Even helped fix a couple of them, which surprised the foreman even more than it did my father."

"And that wasn't enough to convince him to allow you to work there?"

"Well, I was eight at the time, Pieter. Hardly old enough to get a job."

"Ah, I see."

"Then, I started fooling around with my dad's old car, a Hudson we kept in a shed out back. One of the clearest memories I have of being a kid was sweating and sneezing in that hot, dusty old shed one summer while I took that engine apart piece by piece. I guess my folks didn't mind since it kept me quiet and out from underfoot, and I made sure to clean myself up before coming back in the house."

"And did you make it work?"

Hudge nodded. "Yes, sir. Yes, indeedy, I did. I drove that Hudson out of the shed under its own power and parked it by the back door. I honked the horn, and everybody came running." He chuckled. "The looks on their faces . . . Dad was sure that car was shot, and to be truthful, it practically was. And it didn't run for very long, because I didn't have any replacement parts. All I could do was jerry-rig what I had.

"But I *did it!* I made it run, and that was all it took. I never again gave a thought to working at the mill offices, and my father never forgave me for it."

"He was wrong." It was a simple statement of fact, not an argument.

Hudge shrugged. "Doesn't matter, Pieter. He'd never admit it if he was. Anyhow," he continued, spinning slowly around on the stool, "I didn't want another fight, so I left. 'On the road,' as it were."

de Waal nodded. "And this racetrack?"

Hudge laughed. "Oh, that one's easy.

Father of a friend of mine at school used to run out there when it was dirt-track, and they invited me to come by the pits. I told the mechanics about that old Hudson, and just for giggles one of them handed me a monkey wrench and pointed me to a beat-up old engine block in the corner. I gave him back the wrench, grabbed a set of sockets and stripped that block inside of fifteen minutes. *That* made 'em sit up."

"It would certainly have impressed me. How old were you then?"

"Ten, I think. Yeah, ten."

De Waal whistled. "I wonder how many of them could have done the same when they were your age?"

Hudge blushed and looked slightly uncomfortable. "Hmm, well, I guess I've always been a little smart for my age. Anyhow," he hurried on, "after that, I was more than welcome, and they let me help rebuild, do ring jobs, tune-ups, change tires, that sort of thing. I've always been strong for my age, too, and I was doing what I really wanted to do." He paused, smiling at the memory. "That's about the time they started calling me Hudge. By the time I was thirteen, I pretty much had the run of the place. I knew all the mechanics, knew all the tools, and I knew right down to my feet that I was making a difference."

"That's important to you, isn't it?"

"Yeah, I guess it is."

"But you don't think you could have made a difference at the mills?"

"Not in the same way. Not in some office, no. I think I'm smart enough to do it, don't get me wrong. I just wouldn't have been happy."

"Sometimes, my young friend," de Waal said, "it is terribly hard to do the right thing and be happy, too."

Hudge looked sad. "I know that. I just didn't know any other way to handle the situation. Dad got so mad he started talking about military schools, and there's just no way I could ever do that. Anyway," he added, shaking his head, "he didn't want it to make me a better person, he wanted to punish me."

"That's just foolish. Military academies aren't prisons, and they shouldn't be used that way. I don't wonder that you left." de Waal sipped his tea. "And your mother? What's she like?"

"Well, now, Mom isn't like Dad at all. She and her family are all country folks. She and Dad met at church when they were just kids. When his mom died, he left home to go to New York. He and his dad didn't get along, either. According to him," he lowered his voice, "Grampa was a real son-of-a-bitch." Hudge grinned sheepishly. "Guess I shouldn't be too ticked at anything my dad says. He didn't have much of a chance to learn how to do it right."

It was dusk when they left the café and walked back out into the desert heat. de Waal excused himself, saying he had to talk with several people with regard to his assignment. They agreed to meet after the speakers were finished, and that Pieter would find a spot for them to set up Hudge's shelter-half for the night.

Hudge spent the time in between listening to the various speeches and question-and-answer sessions with increasing restlessness; nothing he heard allayed his suspicion that there was little of value to be found here. The man who introduced each speaker in turn was George van Tassel, who not only had organized the conference, but owned the property around them as well.

A few seats over from him, he saw a bearded, thirtyish man "walking" a half-dollar back and forth across the knuckles of his left hand. The man was listening intently, but impatiently, obviously not happy with what he was hearing. Finally he stood up.

"Look, people, I've been coming to these things now for five or six years. I've heard Adamski speak, and Betherum, and Scully, and even you, Mr. Van Tassel, and with all due respect, I'm not seeing a whole lot of consensus here." The crowd muttered at this, but he continued.

"Look around you. You've all *got* to know that there are people here who are flat-out lying to you. I may only be a stage magician, but I know that's the truth. Don't you care about that?"

From the back of the crowd, someone shouted, "Siddown and shut up!"

Van Tassel raised his hand. "No, no," he said. "Let him speak."

The bearded man continued. "I don't know about the rest of you, but I'm sick and tired of getting phone calls at two in the morning to go and stare at the planet Venus yet again. If any of you ever hope to be taken seriously by the rest of the world, you've *got* to pick apart every sighting, every report, every photograph—and you've got to be willing to reject anything that isn't real, regardless of how badly you want to believe in it."

Immediately others began speaking, and it became obvious that the debate could go on for hours, with plenty of acrimony to go around for everybody. Hudge soon gave up and went looking for de Waal. When he found him, they quickly set up the little shelter in a quiet spot near the edge of the crowd. They unrolled their sleeping bags and lay down. They could still hear the voices of those who had stayed near the Rock, but the night sounds from the desert helped cover them.

"So, Hudge. What did you find today?" de Waal asked when they'd settled down.

Hudge was quiet for a long moment. "That there's not much truth here, at least about life on other planets. That most of these folks here are so desperate to believe in something that they'll darn near believe anything." He shifted uneasily in his bag, trying to get comfortable. "And that I'll probably never know for sure one way or the other. How about you?"

"I may have found what my employers are looking for. Perhaps."

Hudge snorted and opened a battered paperback copy of a book called *No World of Their Own*. "Must be pretty amazing if you found it in this bunch."

"Yes, I rather think it is, Hudge." De Waal turned over, away from the boy. "Good night."

"Yeah, g'night, Pieter," Hudge answered as he began chapter four.

Later that night, while Hudge slept, de Waal crept out of his sleeping bag, away from the others around them, and into the desert. He walked quickly and confidently for most of a mile, until he came to an outcropping of rock. He called softly into the darkness and waited.

Moments later, he was joined by a squat figure dressed in black. They exchanged a few words, then touched hands.

de Waal returned to the shelter-half as quietly as he'd left, slipping into his bag without disturbing the boy next to him. He didn't sleep the rest of the night.

The next morning, they had breakfast at a food truck parked by the Rock and talked about events of the day before. Hudge was discouraged by what he saw as a general unwillingness to examine the evidence presented with anything approaching scientific rigor. "They don't want to look at it too close, Pieter," he said as they ate their eggs. "If they did, they'd have to give all this up as a bad job." He shook his head. "People going to Mars, and Pluto, and the Moon . . . mother ships, scout ships, men in black, robots underground aiming rays at people." He wiped his mouth with a napkin and tossed it and the paper plate into a nearby trashcan.

"There was more believable stuff in the pulp magazines thirty years ago, Pieter. That guy last night was right."

"Willful ignorance, Hudge. I don't know of a cure for it."

They finished eating and walked back towards the area where vendors were still doing business. He picked desultorily at the books and pamphlets, finally buying one.

de Waal looked at him curiously. "Pardon me, Hudge, but if you don't have any faith in these things, why spend money on the books?"

The boy laughed sheepishly. "Oh, I dunno, Pieter. Some of this stuff is still pretty cool, at least as artifacts. If you don't take it seriously, it's no worse than collecting spoons." He scanned the nearby tables. "Funny nobody's selling back copies of the old pulp magazines. I'd have thought they'd go over real big around here."

de Waal smiled. "Oh, I very much doubt it. The people gathered here are far too serious about their beliefs to allow the taint of fiction." He waggled his eyebrows.

Hudge snorted laughter. "Yeah, you're right. But that's how I got into this stuff in the first place—by reading my uncle's old pulps. And I'll bet you that there's more than a few of these folks here who have a secret stash of those old rags stuck away somewhere that their buddies don't know about."

"I have an almost complete run of *Astounding* at home, myself," Pieter said as they walked, "although it's been a long time since I had a chance to read them."

Hudge said enviously, "I wish I had some of those. I buy 'em when I can, but I can't keep 'em since I don't have anyplace right now I can call home. I just pass 'em along to somebody else, or trade 'em in for more."

He stopped and looked curiously at a piece of elaborate electrical equipment on a table. He moved closer to hear what was going on.

The salesman was pointing at the device, a foot and a half on a side and a foot tall. There was a faceplate with a meter, several switches and dials, and a row of small neon bulbs, as well as a large, triangular antenna. It looked very impressive; the bulbs were blinking in sequence, the needle on the meter was twitching, and beeps were emanating from somewhere inside. There were several more of the devices in the trunk of the car just behind him.

"Yessiree-Bob, I can tell you without a doubt that this here is the best little UFO detector being sold today. It's powerful, it's effective, and it not only finds the saucers for you, it'll call 'em right down to you with a touch of this button right here." The man pointed to a large red button prominently displayed on the front panel. "Only fifty dollars, and it's GARE-on-teed to work."

"That sounds awful good, mister," said a tall, thin man in overalls and worn boots. "We ain't got a lot of money, though. I mean, I been out of work for . . ."

"A bit down on your luck, huh?" the seller interrupted. "Well, tell you what, friend, seeing as how you're down and out—hell, I been that way m'self more'n once—and since it's the Sabbath, I'll let you have it for . . . oh, let's say thirty dollars."

The thin man's face fell. "Oh. We only got twenty dollars left. Thanks anyway." He started to walk away.

"Hold on there, friend," the salesman called after him. "Can't let a customer walk away unsatisfied, nosiree-Bob. You give me your $20 and take this fine unit right on home with you."

The thin man brightened. "Thanks, mister! I don't mind tellin' you that we could sure use this. I mean," he continued in a low voice, "what with my not having a job, and Muriel and the kids . . . well, if maybe we could get one of these space-people to take us somewhere better . . . it's worth every cent." He reached for his wallet, but Hudge stepped in and placed his hand on the man's arm.

"Wait just a minute, please, sir. Mister," he said to the salesman, "can I look at that thing first?"

"Sonny-boy, I'm trying to make a sale here . . ."

"Yessir, that's what I'm afraid of. I'd like to examine that 'detector,' if I may."

A small crowd had gathered, and the salesman began to look nervous. "That is," Hudge continued, "if you don't have anything to hide."

"Hide? Well, of course I don't have anything to hide, but . . ."

"No buts." The voice was deep, and meant business. "Let the boy see it. Now."

"Y-yes, Mr. Van Tassel. Of course." He pushed the box over to Hudge gingerly, with a thin smile.

Hudge pulled a screwdriver out of his pack and began working. In minutes he had the back off and was looking inside. He stared hard for a moment, then said, "Pieter, you're the electronics guy, take a look at this."

de Waal bent over and examined the components. "Hmm . . . not much here, really, and most of it isn't even connected to anything . . . the transformer wires have been cut. This is working on D-cell batteries." He straightened up and looked at the salesman. "It's 'a bunch of hooey,' I think you call it. A simple RC circuit to make the lights blink, another one to make beeps. Everything else is a dummy. Even these switches aren't wired to anything, and the antenna is connected to this dial only by a string, so it can be turned." He shook his head. "You, sir," he said to the salesman, "are a fraud."

"Yep, that's about what I thought," Hudge said grimly, obviously angry. "I knew I recognized it. This thing is Army surplus. The science club got a bunch of these for my school. They cost about a buck each if the county bought 'em in bulk." He turned on the salesman, fists clenched and white-lipped. "You bastard. You was going to take this man's last dime for this . . . this fake piece of crap, knowing full well it was junk!"

"Now, wait just one minute. . . ." the salesman began.

"Enough," van Tassel said. "How many of these things have you sold this weekend?"

"Not . . . not many. Three, maybe four . . ."

The seller next to him snorted. "'Three, maybe four' my ass. He's unloaded at least a couple dozen of them, Mr. Van Tassel.

"Thank you, Harmon." He turned to Hudge and de Waal. "I'm going to make an announcement in a few moments about this man's dealings. Can you make sure he doesn't leave in the meantime?" Hudge nodded and slipped away.

"Now, look, van Tassel, you can't just . . ."

"*Mister* van Tassel. I *own* all this. I own the airport, I own that Rock over there, and I run these conferences. You'll refund the full price to anyone who brings back one of these bogus 'detectors.' Be very happy that I don't call the sheriff on you."

But the con man wasn't finished. His face turned an ugly red as he pointed a shaking finger at de Waal.

"I may be a fraud, but at least I'm not some kind of commie traitor!"

Van Tassel stopped short. "What do you mean by that?"

"I mean I saw this commie out behind the dunes last night when I got up to take a leak. I followed him out to the rocks," he said in a shrill voice, "and I saw him talking to some other guy in a foreign language. Rooshun, most likely." He spat on the sand. "He's a rotten commie bastard, is what he is."

Van Tassel turned to de Waal, who had stood by impassively while being accused. "Is this true, sir?"

de Waal looked at the con man before answering. "I was, in fact, out by the rocks last night. I had gone there for the same reason this . . . gentleman had." He paused. "It's true that I spoke to another person while there, a fellow Dutchman who was late in arriving. We spoke in our native language, we hear it so seldom when away from home."

Van Tassel held his eyes. "*Bent U een communist?*"

"*Ik zweer op het graf van mijn moeder dat ik geen communist ben.*"

"*Dan ben ik tevreden.*" He nodded. "And now it's time for me to make an announcement that this man," he looked at the seller, "is a fraud and cheat. I suspect you'll leave here far poorer than you'd hoped, sir. Do not attempt to leave, or I *will* call the authorities."

As he turned to leave, Hudge stepped up and handed him a tangle of cables. "Here's his spark-plug harness, Mr. Van Tassel. He ain't going nowhere."

Van Tassel smiled. "Thank you, son. And, you, sir," he said to the thin man, who had stood through all this looking lost and embarrassed. "Did I hear you say that you're unemployed?"

"Well, yes, sir, that's a fact. I been looking, but so far . . ." He shrugged helplessly.

"Seems to me that I could use a man around here to help me with a very special building project a few miles from here. Are you good with your hands?"

The man nodded eagerly. "Oh, yes *sir!* I can hammer nails, paint, plaster, you name it."

"And perhaps your wife can help mine in the café. Let's talk about it." And he laid his arm across the man's thin shoulders and led him away.

de Waal nodded in approval. "Well done, Hudge Pritchert."

Hudge shrugged in embarrassment. "Nah, anybody'd have done that. I just hated to see some poor guy get taken advantage of, is all." He kicked a stone. "C'mon, let's get something to drink. I'm thirsty."

As they walked, Hudge continued to kick the stone, watching as it skittered across the sand. Finally, he spoke quietly.

"Pieter, I don't know you all that well, but you seem to be pretty okay to me. I mean, you're not acting any more strange than anyone else here, and a lot less than some of them are. And if you were a . . . a communist, well, I don't know what I'd think. But it would bother me some, I guess."

de Waal stopped and faced the boy. "Hudge. I am not a communist. I don't like them any more than you do. They'll pose a serious threat for years to come, not only to this country, but to the rest of the world as well." He looked Hudge in the eye. "The man I met last night is an agent of my employers. They didn't want to be seen here, for reasons of their own. Believe me," he smiled humorlessly, "communism is the *last* thing my employers would embrace."

Hudge looked at him thoughtfully, then said, "Okay, that's good enough for me. I'm glad. I'm glad." He booted the stone out of his path, and they continued walking to the café.

As they made their way towards the concessions, de Waal glanced at the boy in speculation. His face set as if he'd come to a decision, and he nodded to himself. But before he could speak, they were approached by a thin, balding man in a sweat-stained shirt, his jacket over his arm.

"Hey, you! Kid!" The man looked hot and harried. He wiped his head with a wilted handkerchief and flashed a badge. "Private detective. You Edgar Allan Poe Hudgins Prescott?"

"'Pritchert,' yes, sir. I am."

The stranger looked at the envelope more closely. "'Pritchert,' right. Party name of Nell Murray set me to find you." He scowled and shook his head. "I been trailing you since you left Wisconsin. If I'd known you was going to end up here, I'd of never took this job." He handed Hudge a letter-sized envelope with his name and his temporary address in Amherst written on the front in his aunt's careful hand.

"What is it?" Hudge asked, turning it over and back.

"Kid, I don't know and I don't care. Just sign this so I can get out of this hellhole and back to civilization." He shoved a small clipboard and pen at the boy, who signed where the man indicated. Without a word, the detective turned his back and began making his way back to the parking lot.

"What is it, Hudge?"

"I don't know, Pieter, but it must be pretty important if my aunt hired a gumshoe to track me down all the way out here. He held the envelope up to the light but could see nothing through the heavy paper. "Huh," he said, looking at the postmark, "she mailed this thing three weeks ago.

"Perhaps you should read it."

"Well, yeah." He was reluctant to open it, knowing there was little chance that it was good news. "Guess I should."

Pulling out his penknife, he slit the envelope, pulled out the single sheet of stationary and began to read.

After a long moment, the letter slipped from his hands, and it looked as though he were on the verge of collapse. de Waal grabbed his arm, picked up the letter and led the boy to the tables under the tent. Hudge sat heavily in the folding chair.

Finally, he spoke in a strained voice. "You read it. I . . . I can't see."

de Waal looked at the letter, his face wrinkled with concern. He read:

"Dear Allan,

I've tried several times to write this letter, but there is no easy way for me to tell you this.

Yesterday afternoon your sister was playing fetch in the front yard with Pepper. Pepper ran out into the street after the ball and Alice ran after him. She was struck by a delivery van and died last night in the hospital.

This is very hard for me to say, Allan, and I know it will be hard for you to hear. You must not come home. Your father is beside himself and somehow blames you for Alice's death. Your mother is hysterical and could never cope if you and your father fought. Neither of them knows I'm writing to you, and both would be furious with me if they did know.

I know you loved your sister, and I know she loved you dearly, more than anyone else in the family. She looked up to you, Allan, and I know that you looked after her as best you could. But some things were meant to happen, even if we don't know the reason why. We are all in God's hands.

Someday you will be able to come back home to us, but now is not the time, no matter how much you must want to. I will say goodbye to Alice for you.

You are a young man now. You'll have to find your own way, at least for a while. I hope you know that I love you, and that I will do whatever I can to help you. If you need money, or anything, all you have to do is ask. Please let me know where you are, wherever you go. We mustn't lose touch.

Believe me when I say that I'm sorry, Allan, about everything. I wish it could be otherwise, but God's will be done.

It was signed, simply, "Aunt Nell."

Hudge was leaning against the back of the chair in front of him, head buried in his arms. de Waal reached out to touch his shoulder, then pulled back, his natural reticence fighting with sympathy for a friend who'd just lost a loved one. He didn't know what to say.

Hudge stayed as he was for a long time, his shoulders trembling. When he finally spoke, his voice was so muffled that de Waal almost couldn't hear him.

"Dad's right. It's my fault. Mine."

"Hudge, you can't . . ."

"No, Pieter, it is." He sat up, face working as he tried not to cry. "See, Alice is . . . *was* only seven. She was a tiny little thing, no bigger'n a bug, I used to say to her. She'd laugh and hug me. She called it a 'bug-hug.'"

de Waal handed him a handkerchief. "She must have loved you very much."

Wiping his eyes, Hudge nodded absently. "She used to tag along with me everywhere I went, always getting in the way and slowing me down. But I couldn't get mad at her. She . . ." His voice caught. "She wasn't real bright, you know? What they call a 'late bloomer.' She wasn't ever going to get much more smart than she already was, but she was so sweet! She just loved . . . everybody. I was an only child till she came, you know? I could have really hated her 'cause she took all my parents' attention away, but she was just so *sweet*, I couldn't."

He swallowed with difficulty. When he spoke again, his voice was unsteady. "There were these kids in our neighborhood. Bad kids. They used to make fun of her, the way she was. They'd keep after her and keep after her until she cried." He banged his fist on the table. "I took out after 'em, Pieter. I got a hold of them and I was gonna kick their asses into the middle of next week, but Alice stopped me. Can you believe that?" He was sobbing now, face twisted with the grimace of a boy who has never let himself cry before. "She wouldn't let me whup 'em. She said, 'Don't, Bubba, don't. They was only kidding me.' I had to let them go, mad as I was. I couldn't disappoint her, do you see?"

"Yes, Hudge, I understand. You loved her as much as she loved you, didn't you?"

Hudge smiled, barely. "She couldn't say 'brother.' When she was real little, she couldn't say the word 'brother,' so she called me 'Bubba,' did I tell you that?"

"You did, but please go on."

"One of my friends heard her one day and he started calling me Bubba until I beat the crap out of him to make him stop. It was the only time she ever got mad at me. 'You *are* my Bubba, Allan. You shouldn't have got mad when he called you that.'" He was quiet for a long time, and de Waal shifted in his seat.

"Aunt Nell is right. I can't go back there now. Dad told me a long time ago, he said, 'Allan, she's your little sister, and you have to take care of her. Your mother and I won't always be here. It's your job to protect her.' And I wasn't there, Pieter. You understand? I wasn't *there*, and now she's dead, and if I'd *been* there she'd probably still be alive!" His tears flowed freely now. "All because I rose up righteous against my father and ran away from home." He turned his face away, sobbing brokenly.

"Young Hudge." De Waal's voice was firm, but not unkind. "If you had been back in Martinsville, where would you have been when your sister was hit by that truck?"

Hudge wiped his eyes and thought. "School, most likely."

"As I thought. So you wouldn't have been there to save her in any case, correct?"

The boy stared at him, then looked away. "It's not that easy, Pieter. I wish it was."

"It can be, Hudge, if you let it."

The boy shook his head, hard. "'Bubba.' My name is Bubba now. It's all I have left to give her. It's all I have left."

It was late Sunday afternoon, and the conference was over. Cars were leaving the parking lot, heading for Highway 247 and Landers. Pilots were taking off, one after another. Dozens of people were walking around the Rock, picking up trash and placing it in large metal cans.

The two friends walked slowly to their motorcycles without speaking. The silence was awkward, but there didn't seem to be a good way to break it. They strapped their gear to the bikes, and then just stood, not looking at each other.

Finally, de Waal spoke. "So, Hudge . . . sorry, 'Bubba.' Where are you going to go now?"

The boy shrugged and squinted out across the Mojave. "Oh, I got places to go, Pieter." His voice was still shaky. "I still got that North Beach scene to check out. It's a long way from here, up around San Francisco about 400 miles, but that's where I was headed to begin with. I could go up to Seattle; I've heard good things about it. There's Tijuana—I've never been to Mexico. I could go back to Amherst and visit the Marshalls. She'd be only too happy to put me together with one of her nieces. Shoot, they'd probably let me move in with them." He straddled the Triumph. "There's a big country out there, and a lot of it's stuck to one side or the other of 66." He laughed bitterly, then turned grim. "There's only one place I can't go. Ever."

"Perhaps one day, though. . . ?"

"Yeah. Maybe." He stomped the kick-start savagely. "I'm not gonna hold my breath, though." He twisted the throttle and the bike roared. "What about you, Pieter?"

"I have to report to my employers. They'll be pleased, I think. I've had a lot more success this time than I've had previously." He straddled his own motorcycle. "After that . . . I don't know. I could go home to Amsterdam and visit my children. Perhaps I'll visit Kinderdijk, where I grew up." He shook his head. "I have no definite plans, though. Maybe we'll meet again at another conference like this?"

"No. There's nothing for me here, either."

There was a moment of silence while both men adjusted their packs. "Look," Bubba said, letting his bike's engine idle. "You didn't count on running into some kid with problems like mine. You sure didn't count on having to nurse me through . . ." His voice caught, and he cleared his throat. "You were patient, and I want to thank you for that. It meant a lot to have somebody there when . . . when I got my aunt's letter. I really appreciate it."

de Waal waved this away in embarrassment. "You stopped to help a stranger yesterday. I helped a friend today. It is more than an even trade, I think."

"Well, okay. If it isn't, I hope I can pass it along some day. It's an easier debt than most, that's for sure." He held out his hand. "Been good to meet you, Pieter. Take care of yourself."

de Waal shook his hand warmly. "And you, too, Bubba. I hope we'll meet again somewhere."

And so they parted company, the boy west and then north, de Waal east, back into the desert.

After dusk began to fall, de Waal pulled the big BSA off the road and carefully made his way to a large rock outcropping. He stopped, pulled the bike up on its center-stand, and got off.

Walking behind the outcropping, he sat with his back against a rock and waited. Presently, a star detached itself from the sky and began to fall in his direction. As it neared the ground, he could see the faint glow from beneath the disk-shaped scoutship and felt a slight prickling as the hairs on his arms stood up. It landed not ten feet from him, silently and gently.

As he approached, a hatch opened and the pilot, a squat humanoid dressed in black, stepped out onto the desert floor. They touched hands in greeting.

"*So*," the pilot said in its lisping speech, "*you were successful this time?*"

"*I think I was, yes,*" de Waal answered in the same tongue, his Dutch accent even more evident.

"*And what makes you think so?*"

"*A feeling. Nothing more than that, but it's a strong one.*" The Dutchman nodded. "*This one could be an important addition to the list. Young, strong-minded, eager . . . and not easily fooled.*"

The pilot nodded. "*Good traits. Does he—she?*"

"*He.*"

"*I* never *get that right. Does he believe?*"

"*He wants to, very badly. They all do, of course.*" de Waal spread his hands with a sigh before continuing, "*But he rejects the 'evidence' that the others accept too readily. He will require unambiguous proof.*"

"*That's easy for you to say,*" the pilot protested. *"I don't like to leave things behind."*

de Waal scratched his head. *"I know, I know. I'll have to think about it."*

"Well," the pilot continued, *"what do you want to do now? There are several months before your next assignment. If you want to go home, I can drop you. It's only a few thousand miles. Twenty minutes, tops."*

de Waal thought. It had been a while since he'd been back to Holland, but something the young American had said piqued his interest.

"No, thank you," he said to the pilot. *"I have a good bike, and an open road, and I think I'd like to see what America looks like. I will attempt,"* he added with a chuckle, *"to get my kicks on Route 66."*

The pilot looked puzzled; he often didn't understand how the people of this place thought, but that wasn't his job anyway. His job was to fly the scoutship and take reports. He didn't get paid to do anything else.

de Waal smiled briefly. *"I think I have the perfect way to convince our young candidate. We can't give him back everything he's lost, but maybe we can give him back his faith. Can you do this. . . ?"* And he spoke at length to the pilot.

"Certainly, if you think it'll help. Gods know there's nobody else around to see out here."

"Splendid! See you in a few months, then." And he rode off to find a suitable spot to camp for the night.

The pilot stepped back into his ship and took off straight up. Climbing to the clouds low overhead, he scanned the area. When he found what he was looking for, he set course and began his descent. His face folded itself into the equivalent of a grin; this was going to be *fun.*

He broke out of the clouds just over a crossroad. He dropped to within a few hundred feet of the ground, and stopped dead in the air. He began to activate most of the non-essential controls in the cabin.

Immediately, the equivalent of lights, wipers, high-beams, turn signals, emergency blinkers and all the other accessory-analogs the pilot had been accumulating for years came to life: the underside of the scoutship pulsed blue, then red, then orange; a number of radar-like apparati started sweeping back and forth; landing lights began to blink on and off rapidly in a pattern meaningless to humans, but which spelled out the name of the pilot's favorite sports-team equivalent.

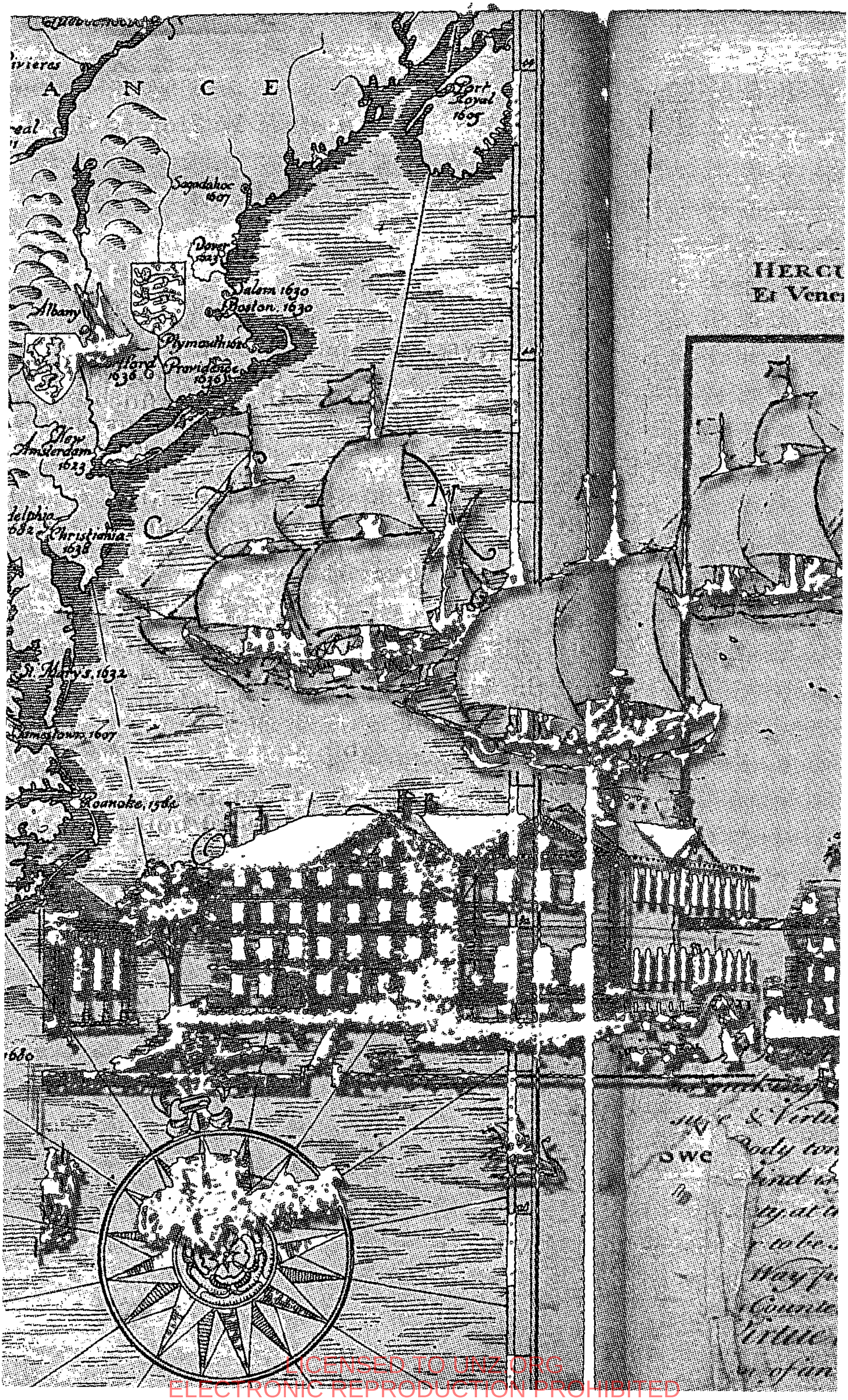
As an after-thought, he switched on a recording of his youngest litter-mate's pre-maturation ceremony and activated the external sound emitters. A dull, throbbing pulse interspersed with siren-like wails set his teeth-equivalents on edge; he'd thought that the musicians that had been hired were execrable, but his litter-mate had been practically apoplectic with ecstasy. *Kids*, he thought. *Go figure.*

Last, he switched on his searchlight and pinpointed the figure huddled by the fire below him for a few brief seconds, then switched it off and sped out of sight like a bullet, shaking with the equivalent of laughter. Now, *this* was a story to tell around the refueling depots! If this didn't convince the young candidate back there, *nothing* would.

Bubba Pritchert sat open-mouthed, his tin can of stew forgotten as it bubbled over the fire. The book he'd been reading by lantern-light had fallen to his side in the sand, and his throat didn't seem to work at all well.

Finally he managed to swallow, and ran a shaking hand through his hair. "Well . . ." he said tremulously. "Well . . . D-dip me in dogshit." ■

(EDITOR'S NOTE: This story precedes "Bubba Pritchert and the Space Aliens" [July 1994] and "The Three Labors of Bubba" [June 1996].)

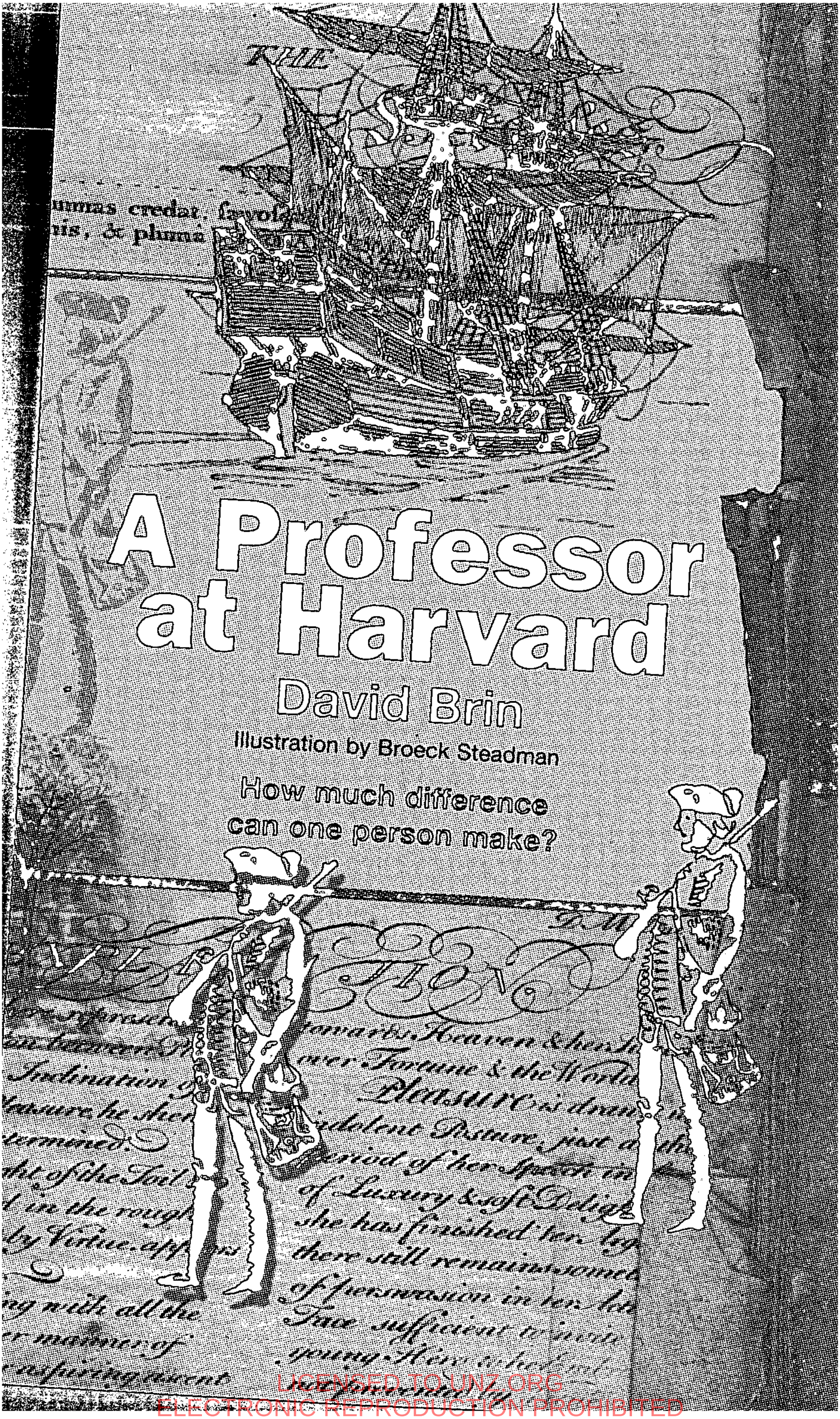

A N C E
Port Royal 1605
Sagadahoc 1607
Dover 1623
Salem 1630
Boston 1630
Albany
Plymouth 1620
Hartford 1636
Providence 1636
New Amsterdam 1623
delphia 1682
Christinia 1638
St. Mary's 1632
Jamestown 1607
Roanoke 1585
1680
HERCU
Et Vene

A Professor at Harvard

David Brin

Illustration by Broeck Steadman

How much difference can one person make?



Dear Lilly,

This transcription may be a bit rough. I'm dashing it off quickly reasons that should soon be obvious. Exciting news! Still, let me ask that u please don't speak of this, or let it k till I've had a chance to put my find- gs in a more academic format.

Since May of 2002, I've been engaged catalog the Thomas Kuiper Collec- on, which Harvard acquired in that no- rious bidding war a couple of years go, on eBay. The acclaimed as- onomer-philosopher had been amass- g trunkloads of documents from the te sixteenth and early seventeenth cen- uries—individually and in batches—with no apparent pattern, rhyme, or rea- on. Accounts of the Dutch Revolution. etters from Johannes Kepler. Sailing manifests of ports in southern England. Ledgers and correspondence from the talian Inquisition. Early documents of Massachusetts Bay Colony and narratives about the establishment of Harvard Col- ege.

The last category was what most interested the trustees, so I got to work separating them from the apparent clutter. That is, it *seemed* clutter, an unrelated jumble . . . till intriguing patterns began to emerge.

Let me trace the story as was revealed to me, in bits and pieces. It begins with the apprenticeship of a young English boy named Henry Stephens.

Henry was born to a family of petit-gentry farmers in Kent, during the year 1595. According to parish records, his birth merited noting as *mirabilus*—he was premature and should have died of the typhus that claimed his mother, but somehow the infant survived.

He arrived during a time of turmoil. Parliament had passed a law that anyone who questioned the Queen's religious supremacy or persistently absented himself from Anglican services should be imprisoned or banished from the country. Henry's father was a leader among the Puritan dissenters in one of England's least tolerant counties. Hence, the family was soon hurrying off to exile, departing by ship for the Dutch city of Leiden.

Leiden, you'll recall, was already renowned for its brave resistance to the Spanish army of Philip II. As a reward, Prince William of Orange and the Dutch parliament gave the city a choice: freedom from taxes for a hundred years, or the right to establish a university. Leiden chose a university.

Here the Stephens family joined a growing expatriate community—English dissenters, French Huguenots, Jews, and others thronging into the cities of Middelburg, Leiden, and Amsterdam. Under the Union of Utrecht, Holland was the first nation to explicitly respect individual political and religious liberty and to recognize the sovereignty of the people, rather than the monarch. (Both the American and French Revolutions specifically referred to this precedent).

Henry was apparently a bright young fellow. Not only did he adjust quickly—growing up multilingual in English, Dutch and Latin—but he showed an early flair for practical arts like smithing and surveying.

The latter profession grew especially prominent as the Dutch transformed their landscape, sculpting it with dikes and levees, claiming vast acreage from the sea. Overcoming resistance from his traditionalist father, Henry managed to get himself apprenticed to the greatest surveyor of the time, Willebrord Snel van Leeuwen—or *Snellius*. In that position, Henry would have been involved in a geodetic mapping of Holland—the first great project of triangulation to establish firm lines of location and orientation—using methods still applied today.

While working for Snellius, Henry apparently audited some courses offered by Willebrord's father—Professor Rudolphus Snellius—at the University of Leiden. Rudolphus lectured on *"Planetarum Theorica et Euclidis Elementa"* and evidently was a follower of Copernicus. Meanwhile, the son—also authorized to teach astronomy—specialized in the Almagest of Ptolemeus!

The Kuiper Collection contains a lovely little notebook, written in a fine hand—though in rather vulgar Latin—wherein Henry Stephens describes the ongoing intellectual dispute between those two famous Dutch scholars, Snellius elder and younger. Witnessing this intellectual tussle first-hand must have been a treat for Henry, who would have known how few opportunities there were for open discourse in the world beyond Leiden.

But things were just getting interesting. For at the very same moment that a teenage apprentice was tracking amiable family quarrels over heliocentric versus geocentric astronomies, some nearby Dutchman was busy crafting the world's first telescope.

The actual inventor is unknown—secrecy was a bad habit practiced by many innovators of that time. Till now, the earliest mention was in September 1608, when a man "from the low countries" offered a telescope for sale at the annual Frankfurt fair. It had a convex and a concave lens, offering a magnification of seven times. So I felt a rising sense of interest when I read Henry's excited account of the news, dated six months earlier (!), offering some clues that scholars may find worth pursuing.

Later though. Not today. For you see, I left that trail just as soon as *another* grew apparent. One far more exciting.

Here's a hint: word of the new instrument, flying across Europe by personal letter, soon reached a certain person in northern Italy. Someone who, from description alone, was able to re-invent the telescope and put it to exceptionally good use.

Yes, I'm referring to the Sage of Pisa. Big *G* himself! And soon the whole continent was abuzz about his great discoveries—the moons of Jupiter, lunar mountains, the phases of Venus, and so on. Naturally, all of this excited old Rudolphus, while poor grumpy Willebrord muttered that it seemed presumptuous to draw cosmological conclusions from such evidence. Both Snellius *patris* and *filio* agreed, however, that it would be a good idea to send a representative south, as quickly as possible, to learn first hand about any improvements in telescope design that could aid the practical art of surveying.

So it was that in the year 1612, at age seventeen, young Henry Stephens of Kent headed off to Italy . . .

. . . and there the documented story stops for a few years. From peripheral evidence—bank records and such—it would appear that small amounts were sent to Pisa from Snel family accounts in the form of a "stipend." Nothing large or well-attributed, but a steady stream that lasted until about 1616, when "H. Stefuns" abruptly reappears in the employment ledger of Willebrord the surveyor.

What was Henry up to all that time? One might squint and imagine him counting pulse-beats in order to help time a pendulum's sway. Or using his keen surveyor's eye to track a ball's descent along an inclined plane. Did he help to sketch Saturn's rings? Might *his* hands have dropped two weights—heavy and light—over the rail of a leaning tower, while the master physicist stood watching below?

There is no way to tell. Not even from documents in the Kuiper Compilation.

There *is*, however, another item from this period that Kuiper missed, but that I found in a scan of Vatican archives. An early letter from the Italian scientist Evangelista Torricelli to someone he calls "Uncle Henri"—whom he apparently met as a child around 1614. Oblique references are enticing. Was this "Henri" the same man with whom Torricelli would have later adventures?

Alas, the letter has passed through so many collectors' hands over the years that its provenance is unclear. We must wait some time for Torricelli to enter our story in a provable or decisive way.

Meanwhile, back to Henry Stephens. After his return to Leiden in 1616, there is little of significance for several years. His name appears regularly in account ledgers. Also on survey maps, which he is now signing on his own behalf as people begin to rely ever more on the geodetic arts he helped develop. Willebrord Snellius was by now hauling in f600 per annum and Journeyman Henry apparently earned his share.

Oh, a name very similar to Henry's can be found on the membership rolls of the Leiden Society, a philosophical club with highly distinguished membership. The spelling is slightly different, but people were lackadaisical about such things in those days. Anyway, it's a good guess that Henry kept up his interest in science, paying keen attention to new developments.

Then, abruptly, his world changed again.

Conditions had grown worse for dissenters back in England. Henry's father, having returned home to press for concessions from James I, was rewarded with imprisonment. Finally, the king offered a deal: amnesty in exchange for a new and extreme form of exile—participation in a fresh attempt to settle an English colony in the New World.

Of course, everyone knows about the Pilgrims, their reasons for fleeing England and setting forth on the Mayflower, imagining that they were bound for Virginia, though by chicanery and mischance they wound up instead along the New England coast above Cape Cod. All of that is standard catechism in American History One-A, offering a mythic basis for our Thanksgiving holiday. And much of it is just plain wrong.

For one thing, the Mayflower did not first set forth from Plymouth, England. It only stopped there briefly to take on a few more colonists and supplies, having actually begun its voyage in Holland. The expatriate community was the true source of people and material.

And right there, listed among the ship's complement, having obediently joined his father and family, you will find a stalwart young man of twenty-five—Henry Stephens.

Again, details are sketchy. After a rigorous crossing oft portrayed in book and film, the Pilgrims arrived at Plymouth Rock on December 21, 1620.

Professor Kuiper hunted among colonial records and found occasional glimpses of our hero. Apparently he survived that terrible first winter and did more than his share to help the young colony endure. Relations with the local natives were crucial and Professor Kuiper scribbled a number of notes which I hope to follow up on later. One of them suggests that Henry went west for some time to live among the Mohegan and other tribes, exploring great distances, making drawings, and collecting samples of flora and fauna.

If so, we may have finally discovered the name of the "American friend" who supplied William Harvey with his famous New World Collection, the core element upon which Edmond Halley later began sketching his Theory of Evolution!

Henry's first provable reappearance in the record comes in 1625, with his marriage to Prosper White-Moon Forest—a name that provokes interesting speculation. There is no way to verify that his wife was a Native American woman, though subsequent township entries show eight children, only one of whom appears to have died young—apparently a happy and productive family for the time. Certainly any bias or hostility toward Prosper must have been quelled by respect. Her name is noted prominently among those who succored the sick during the pestilence year of 1627.

Further evidence of local esteem came in 1629, when Henry was engaged by the new Massachusetts Bay Colony as official surveyor. This led to what was heretofore his principal claim for historical notice, as architect who laid down the basic plan for Boston Town—a plan that included innovative arterial and peripheral lanes, looking far beyond the town's rude origins. As you may know, it became a model for future urban design that would be called the New England Style.

This rapid success might have led Henry directly to a position of great stature in the growing colony, had not events brought his tenure to an abrupt end in 1631. That was the year, you'll recall, when *Roger Williams* stirred up a hornet's nest in the Bay Colony, by advocating unlimited religious tolerance—even for Catholics, Jews, and infidels.

Forced temporarily to flee Boston, Williams and his adherents established a flourishing new colony in Rhode Island—before returning to Boston in triumph in 1634. And yes, the first township of this new colony, this center of tolerance, was surveyed and laid out by you-know-who.

It's here that things take a decidedly odd turn.

Odd? That doesn't half describe how I felt when I began to realize what happened next. Lilly, I have barely slept for the last week! Instead I popped pills and wore electrodes in order to concentrate as a skein of connections began taking shape.

For example, I had simply assumed that Professor Kuiper's hoard was so *eclectic* because of an obsessive interest in a certain period of time—nothing more. He seemed to have grabbed things randomly! So many documents, with so little connecting tissue between them.

Take the rare and valuable first edition that many consider the centerpiece of his collection—a rather beaten but still beautiful copy of *"Dialogo Sopra I Due Massimi Sistemi Del Mondo"* or "A Dialogue Concerning Two Systems Of The World."

(This document alone helped drive the eBay bidding war, which Harvard eventually topped because the collection also contained many papers of local interest.)

A copy of the *Dialogue!* I felt awed just touching it with gloved hands. Did any other book do more to propel the birth of modern science? The debate between the Copernican and Ptolemaic astronomical systems reached its zenith within this publication, sparking a frenzy of reaction—not all of it favorable! Responding to this implicit challenge, the Papal Palace and the Inquisition were so severe that most of Italy's finest researchers emigrated during the decade that followed, many of them settling in Leiden and Amsterdam.

That included young Evangelista Torricelli, who by 1631 was already well-known as a rising star of physical science. Settling in Holland, Torricelli commenced rubbing elbows with friends of his "Uncle Henri" and performing experiments that would lead to invention of the barometer.

In correspondence that year, Torricelli shows deep worry about his old master, back in Pisa. Often he would use code words and initials. Obscurity was a form of protective covering in those days and he did not want to get the old man in even worse trouble. It would do no good for "G" to be seen as a martyr or *cause celebre* in Protestant lands up north. That might only antagonize the Inquisition even further.

Still, Torricelli's sense of despond grew evident as he wrote to friends all over Europe, passing on word of the crime being committed against his old master. Without naming names, Torricelli described the imprisonment of a great and brilliant man. Threats of torture, the coerced abjuration of his life's work . . . and then even worse torment as the gray-bearded *Professore* entered confinement under house arrest, forbidden ever to leave his home or stroll the lanes and hills, or even to correspond (except clandestinely) with other lively minds.

What does all of this have to do with that copy of *"Dialogo"* in the Kuiper Collection?

Like many books that are centuries old, this one has accumulated a morass of margin notes and annotations, scribbled by various owners over the years—some of them cogent glosses upon the elegant mathematical and physical arguments, and others written by perplexed or skeptical or hostile readers. But one large note especially caught my eye. Latin words on the flyleaf, penned in a flowing hand. Words that translate as:

> *To the designer of Providence.*
> *Come soon, deliverance of our father.*

All previous scholars who examined this particular copy of *"Dialogo"* have assumed that the inscription on the flyleaf was simply a benediction or dedication to the Almighty, though in rather unconventional form.

No one knew what to make of the signature, consisting of two large letters.

ET.

Can you see where I'm heading with this?

Struck by a sudden suspicion, I arranged for Kuiper's edition of *"Dialogo"* to be examined by the Archaeology Department, where special interest soon focused on dried botanical materials embedded at the tight joining of numerous pages. All sorts of debris can settle into any book that endures four centuries. But lately, instead of just brushing it away, people have begun studying this material. Imagine my excitement when the report came in—pollen, seeds and stem residue from an array of plant types . . . nearly *all* of then native to New England!

It occurred to me that the phrase *"designer of Providence"* might not—i this case—have solely a religious import!

Could it be a coded salutation to a *architectural surveyor?* One who established the street plan of the capital o Rhode Island?

Might "father" in this case refer not t the Almighty, but instead to somebod far more temporal and immediate—th way two apprentices refer to thei beloved master?

What I *can* verify from the ope record is this. Soon after helping Roge Williams return to Boston in triumph Henry Stephens hastily took his leave o America and his family, departing on vessel bound for Holland.

Why that particular moment? I should have been an exciting time fo such a fellow. The foundations for whole new civilization were being laid Who can doubt that Henry took an important part in early discussions wit Williams, Winthrop, Anne Hutchinso and others—deliberations over the bes way to establish tolerance and lastin peace with native tribes. How to institute better systems of justice and education. Discussions that would soon bea surprising fruit.

And yet, just as the fruit was ripening Stephens *left,* hurrying back to a Europ that he now considered decadent an corrupt. What provoked this sudde flight from his cherished New World?

It was July, 1634. Antwerp shippin records show him disembarking ther on the 5th.

On the 20th, a vague notation in th Town Hall archive tells of a meeting between several guildmasters and a grou of "foreign doctors"—a term that coul apply to any group of educated peopl from beyond the city walls. Only th timing seems provocative.

In early August, the Maritime Ban

recorded a large withdrawal of 250 florins from the account of Willebrord Snellius, authorized in payment to "H. Stefuns" by letter of credit from Leiden.

Travel expenses? Plus some extra for clandestine bribes? Yes, the clues are slim even for speculating. And yet we also know that at this time the young exiled scholar, Evangelista Torricelli, vacated his home. Bidding farewell to his local patrons, he then mysteriously vanished from sight forever.

So, temporarily, did Henry Stephens. For almost a year there is no sign of either man. No letters. No known mention of anyone seeing them . . .

. . . not until the spring of 1635, when Henry stepped once more upon the wharf in Boston Town, into the waiting arms of Prosper and their children. Sons and daughters who presumably clamored around their Papa, shouting the age-old refrain—

"*What did you bring me? What did you bring me?*"

What he brought them was the future.

Oops, sorry about that, Lilly. You must be chafing for me to get to the point.

Or did you cheat?

Have you already done a quick mentat-scan of the archives, skipping past Henry's name on the *Gravenhage* ship manifest, looking to see who *else* disembarked along with him that bright April day?

No, it won't be that obvious. They were afraid, you see, and with good reason.

True, the Holy See quickly forgave the fugitive and declared him safe from retribution. But the secretive masters of the Inquisition were less eager to pardon a famous escapee. They had already proved relentless in pursuit of those who slip away. While pretending that he still languished in custody, they must have sent agents everywhere, searching . . .

So look instead for assumed names! Protective camouflage.

Try *Mr. Quicksilver*, which was the common word in English for mercury, a metal that is liquid at room temperature and a key ingredient in early barometers. Is the name familiar? It would be if you went to *this* university. And now it's plain—that had to be Torricelli! A flood of scholarly papers may come from this connection alone. An old mystery solved.

But move on now to the real news. Have you scanned the passenger list carefully?

How about "Mr. Kinneret"?

Kinneret—one of the alternate names, in Hebrew, for the Sea of Galilee.

Yes, dear. Kinneret.

I'm looking at his portrait right now, on the Wall of Founders. And despite obvious efforts at disguise—no beard, for example—it astonishes me that no one has commented till now on the resemblance between Harvard's earliest Professor of Natural Philosophy and the scholar who we are told died quietly under house arrest in Pisa, way back in 1642.

It makes you wonder. Would a Catholic savant from "papist" Italy have been welcome in Puritan Boston—or on the faculty of John Harvard's new college—without the quiet revolution of reason that Roger Williams set in motion?

Would that revolution have been so profound or successful, without strong support from the Surveyor's Guild and the Seven United Tribes?

Lacking the influence of Kinneret, might the American tradition of excellence in mathematics and science have been delayed for decades? Maybe centuries?

Sitting here in the Harvard University Library, staring out the window at rowers on the river, I can scarcely believe that less than four centuries have passed since the *Gravenhage* docked not far from here on that chilly spring morning of 1635. Three hundred and sixty seven years ago, to be exact.

Is that all? Think about it, Lilly—just fifteen human generations, from those rustic beginnings to the dawn of a new millennium. How the world has changed.

Ill-disciplined, I left my transcriber set to record *Surface Thoughts,* and so these personal musings have all been logged for you to savor, if you choose high-fidelity download. But can even that convey the emotion I feel while marveling at the secret twists and turns of history?

If only some kind of time—or paratime—travel were possible, so history could become an observational . . . or even experimental . . . science! Instead we are left to use primitive methods, piecing together clues, sniffing and burrowing in dusty records, hoping the essential story has not been completely lost.

Yearning to shed a ray of light on whatever made us who we are.

How much difference can one person make, I wonder? Even one gifted with talent and goodness and skill—and the indomitable will to persevere?

Maybe some group *other* than the Iroquois would have invented the steamboat and the Continental Train, even if James Watt hadn't emigrated and "gone native." But how ever could the Pan American Covenant have succeeded without Ben Franklin sitting there in Havana, to jest and soothe all the bickering delegates into signing?

How important was Abraham Lincoln's Johannesburg Address in rousing the world to finish off slavery and apartheid? Might the flagging struggle have failed without him? Or is progress really a team effort, the way Kip Thorne credits his colleagues—*meta-Einstein* and *meta-Feynman*—claiming that he never could have created the transfer drive without their help?

Even this fine Widener Library where I sit—bequeathed to Harvard by one of the alumni who died when *Titanic* hit that asteroid in 1912—seems to support the notion that things will happen pretty much the same, whether or not a specific individual or group happens to be on the scene.

No one can answer these questions. My own recent discoveries—following a path blazed by Kuiper and others—don't change things very much. Except perhaps to offer a sense of satisfaction—much like the gratification Henry Stephens must have felt the day he stepped down the wharf, embracing his family, shaking the hand of his friend Williams, and breathing the heady air of freedom in this new world . . .

. . . then turning to introduce his friends from across the sea. Friends who would do epochal things during the following twenty years, becoming legends while Henry himself faded into contented obscurity.

Can one person change the world?

Maybe not.

So instead let's ask; what would *Harvard* be like, if not for Quicksilver-Torricelli?

Or if not for Professor Galileo Galilei. ■

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Brownian Motion

Richard A. Lovett

In any "random" search, efficiency helps—
but there's still one more thing you need.

Albert Barnett was on his thirty-eighth blind date of the week and finally feeling comfortable with the process. This one's name was Peg and they were meeting in the lobby of the Heathman Pub where she'd be easy to spot, even if she forgot the maroon windbreaker she'd promised to carry as a prop. Only once had Albert failed to identify his date quickly—and that one had wanted to meet, via holo, at a real singles dance. Everyone had been unattached, and they'd all given him the same hesitant once-over as he read endless "Hello, My name is . . ." tags, seeking a blonde, blue-eyed "April." The Heathman no longer existed except in holospace, which meant that even if Albert had to resort to shouting Peg's name, the only people who'd notice would be other HoloDaters using the same set.

The week was an expensive experiment. The ad had arrived in Albert's mailbox three months before, and rather than tossing it immediately into the recycling bin, he'd stashed it in his guilt pile. There, it shared space with bank statements he might someday balance, fundraising letters from worthy causes, personal notes he once believed he'd find time to answer, and a select group of other ads. It depicted a happy couple holding hands and walking a beach in Hawaii, Tahiti, or somewhere else warm and tropical. They were tanned, toned, beautiful, obviously in love—and presumably paid models who'd never before seen each other. "Meet the person of your dreams . . . in the setting of *your* choice," it began. "HoloDaters International announces the West Coast's first holographic dating service—not a chat room or a fantasy reality, but a 'transported' reality in which you and your date interact *exactly* as you would in real life. Trial offers from $1,995."

HoloDaters had probably obtained his name from one of the many groups Albert had attended during his too-many years as a supposedly eligible single in the New Economy. He was a computer troubleshooter for a Silicon Forest consulting firm that encouraged its employees to telecommute rather than fight traffic on Portland's Sunset Highway. The job was great for those with families—good, too, for Albert, who could live on the opposite side of town, near the airport for the way-too-many times he had to travel. But it was hell on the social life. He met plenty of women, but always in faraway places like London, Dallas, or Australia—his favorite country if it weren't for the jet lag. At home, never comfortable with the *faux* suave desperation of singles bars, he'd turned first to singles groups, then to the personal ads, inspired by his best friend, who'd met his wife by answering her ad, proving that such methods sometimes produced happy results.

Holodating was new to him, but he knew enough about the technology to understand how it must work. You could beam a lifelike image anywhere within range of a holoprojection grid. A remote-sensing projector connected to a virtual reality headset would give you near-perfect video and audio feedback, and the latest nerve inducers even boasted taste and smell. Tactile feedback was more difficult, but it could be done well enough with a full-body VR suit.

Travel companies were scrambling to exploit the opportunities. Theoretically, holo technology might someday allow Albert to cut down on his travel, move to a trendier part of town, and at least occasionally work at company headquarters, where he could meet women who lived in his own part of the world. But projections were limited. They couldn't pick up real objects, or peer into nooks and crannies too far removed from the projector. Such work had to be done in person.

Dating was different, at least in the getting-acquainted stages. Nobody wanted physical intimacy until both people could provide certificates of freedom from neo-AIDS. If the evening really went well, holosex might be possible, but Albert was sufficiently repulsed by the possibility of a computer recording the whole thing that he didn't even want to contemplate the idea. Holodating as a way to meet a large number of women, however, was appealing enough that periodically he pulled out the ad and stared at it anew—especially after particularly distressing dates.

Of late, he'd been having more and more of those, inspired by the frustratingly imprecise language used in the personals. If a woman described herself as "Titian's beauty," she might or might not be a redhead. She would be 100 pounds overweight. "Educated professional" meant "I graduated from high school and (probably) have a job," "blue eyes" could be gray or green, and "attractive" was a meaningless word everyone used. In fact, most ads were largely meaningless. "SWF, 35, enjoys romantic dinners, moonlight walks on the beach, evenings by the fire." Who doesn't? Albert's own ad was designed to describe what made him unique rather than what he had in common with the rest of the world. He'd struggled with the wording for hours, finally settling on:

Family-Values Hacker
High-priced computer consultant by
day, 4-wheeler cowboy by weekend.
Politically liberal, personally conservative Lutheran; 42, horse-owner, loves
mountains, high desert.
Seeks intelligent, athletic, professional
woman with youthful zest for life.
Points for desert rat.

But so far, nothing had worked out. Some women weren't as interesting in person as in pre-date telephone chats; others felt the same way about him. Albert's sister, happily married to her high school sweetheart, was sometimes aggravatingly chipper when he told her these stories, sometimes depressingly insightful. "I feel so lucky," she said in one of the latter moods. "Being single is like two atoms bouncing around, having to hit each other just right before they'll react. Each may have to bounce off hundreds or thousands or millions of others before it bumps into the right one in just the right way."

Chemistry had never been Albert's strong suit, but he recalled looking through a microscope at floating dust motes, dancing randomly as they were jarred first one way and then another by collisions with fast-moving water molecules. This aimless jiggling, he'd been told, was called Brownian motion. The chief difference between himself and the flecks of dust was that the dust had dozens of random encounters every few seconds, while he invested days in each worthless date.

The final straw was a woman named Chris, who'd admitted she "wasn't quite" as athletic as he was. "That's okay," Albert had said, truthfully enough. Oh, if he could write a prescription, he'd call for a 35-year-old aerobics instructor with red hair and a Ph.D., but none of those really mattered.

Unfortunately, Chris proved to have stick-figure arms with muscles that sagged like an octogenarian's and a desire to seek out an elevator when she learned that the bar he'd chosen was on the second floor.

Such dates always made Albert feel guilty. He wanted to be an equal-opportunity dater, but he immediately knew the evening would be yet another waste. Still, he spent two polite hours with her, at the end of which he heard the dreaded words escape his lips: "I'll call you." Which, of course, he hadn't, giving himself a real reason to feel guilty. A few days later, he pulled the HoloDaters ad out of its cubbyhole and made an appointment for a free, informational interview.

The office was in the Pearl District, a zone of heavy-beamed warehouses gentrified into galleries, restaurants, and exotic condominiums on the periphery of downtown. It was the perfect place for a start-up business: a trendy neighborhood still near enough to its roots to provide modest-priced office space close to the city center.

After a brief wait, Albert was greeted by a man who introduced himself as Eric Hanson. Hanson gave Albert a quick, businesslike handshake, then ushered him to an interior office that was well appointed but not posh—a careful statement that HoloDaters was adequately funded and professional, but not squandering client money on frills.

"Coffee?" he asked.

Albert declined. Like most Northwesterners, he was addicted to the stuff, but he'd already had a latte on his way into town. More, and he'd jitter all the way through the interview.

Hanson waved him to a chair and got down to business. "What's the number one obstacle to meeting the right person in today's culture?" he began, and for a moment Albert thought he'd prove to be one of those obnoxious salespersons who force you to answer their rhetorical questions.

But Hanson had his pitch down more smoothly that that. "A lot of people would say lack of time, but it goes beyond that," he said. "It's time crossed with opportunity. Suppose you meet a cute—" Hanson's eyes stole to a screening form Albert had filled out as a preliminary to this appointment, where he had checked a prominent box marked *hetero,* "—woman. Perhaps in a supermarket checkout line. Even if you're bold enough to ask for her phone number and she's willing to give it to you, it takes a dozen calls scattered over a month to find a night when you're both free. An hour into the evening, you're likely to discover that for whatever reason, you're not right for each other. You've squandered all that time, all those phone calls, your free evening, and your dating energy, only to find yourself back at square one, a month older and—let's face it—a month lonelier.

"HoloDaters can't promise you a good date. Other services have tried that for years, and look at their success rates: not much better than what people do on their own. What we *can* do is substantially increase your dating *efficiency*."

Hanson paused for a reaction, but Albert had never enjoyed sales pitches, even for products he fully expected to buy. Now his mind offered an image of a dating assembly line on which men and women flicked by each other in a conveyor-belt sequence of first-impression snapshots. *Too tall—click, whir. Too old—click, whir. Too many tattoos—click, whir. Not enough tattoos—click, whir. Body piercing* where?!—*click, whir*. Nevertheless, Hanson was right. The assembly line applied to all dating processes. Sometimes it went unnoticed. On other occasions, each *click-whir-reject* drained time and effort.

Hanson had resumed speaking. ". . . the perfect service for the discriminating dater who knows the value of time. There's no need to spend a full evening with each prospect. Since you're simply projecting yourself, you can end the projection at will. Just push the panic button"—he waved a device that looked like a television remote control—"and 'poof'—you're back in your projection cubicle, ready to start the next date. Some people find the right person the first time and spend the whole evening together; others cycle through half the catalog—kind of like the proverbial kid in the candy store."

Or a gourmet in the Food Court of Uniform Blandness, Albert thought. But he was hooked and he knew it. Chris alone had sucked several hours out of his social calendar, with nothing in return but guilt. Anything had to be better than that.

The rest of the interview involved details. The $1,995 introductory special would give him a month of Tuesday nights. These were the lowest-demand evenings, which was why they were on sale, but limiting himself to Tuesdays minimized the number of women to choose from. Weekends were in higher demand, and priced to match. "Remember," Hanson explained, "this is a real-time, live encounter, so you and your date both have to be in projection rooms at the same time. You needn't be in the same city, or even the same continent, but you do need to be able to interact. Weekends are easier for most people to schedule; weekdays are more appealing to the budget-minded."

Tropical beaches were a pricey add-on—costing somewhere on the order of $2,000 per hour. "Sorry," Hanson said, "but there's a lot of overhead involved in setting that up. It's wonderful if you can afford it—you can feel the warmth of the sun and let the sand squish between your toes. But it takes a lot of equipment." He paused, attempting to gauge Albert's financial status. "You do meet some fabulous women that way. Jet-setters from all over the world."

"Nah," Albert said. He had little interest in heiresses, and no problem meeting women from far-flung cities. "I'm looking for someone local."

"Then you can limit your search to Portland," Hanson said, "or add in Seattle, San Francisco, or as large a region as you'd like. The bigger the region, of course, the bigger the pool of prospects, but we have hundreds of active files here in the Northwest."

A few minutes later, Albert signed up for the Five-City Weekday Immersion Plan. The program lightened his bank account by $3,995 and gave him "all the dating you can do" on Monday through Thursday evenings of the week of his choice. He also got an early evening "bonus" on Friday, from 4:30 to 6:30.

"That's a good compromise," Hanson said. "It gives you access to everyone who uses the facility on weekdays, which will be a goodly fraction of our clientele. You'll have a different mix of women to choose from each evening."

All told, Albert figured he could log about twenty hours of dating. Depending on how long he spent with each prospect, that would give him more dates than he'd had in the previous two years. He couldn't decide if that was exciting or scary.

Not one to waste time once he'd made a decision, Albert was ready to start dating the following Monday. Over the weekend, he scheduled an hour-long calibration session at which a technician introduced him to the equipment and tweaked parameters to make the feedback as realistic a possible. While his hardware-festooned body mimed the motions his projection felt as though it were doing, Albert sampled a demo routine in which he walked up a flight of stairs, worked a computer console, and sat in a meadow with a breeze blowing across his face. It was all very impressive. On impulse, he pulled a paperback book out of his *real* coat pocket, found his bookmark, and began reading, very realistically, via the projection. Impressive, indeed.

"Anything you're wearing or carrying becomes part of the projection," the technician explained afterward. "If you're the type of person who likes to fiddle with a pen, key ring, or loose change, make sure you have it with you in the projection booth. Objects you encounter on the other end will look and feel real, but you won't be able to move them. Even a paper clip will feel as though it's been nailed down. The only exceptions are the drinks."

"Drinks?" Albert asked.

"Mr. Hanson didn't tell you?"

Albert shook his head. "I was more interested in the women."

The technician nodded. "Well, most of your dates will be at bars, coffee shops, or singles clubs—the types of places you'd be likely to pick, in the real. They're listed in the catalog: two or three for each city in your dating region."

Albert nodded encouragingly. He'd recognized most of the places in his chosen cities: Portland, Seattle/Tacoma, Boise, Spokane, and San Francisco/Oakland/San Jose.

"The projection begins by beaming you into a lobby—possibly with a brief delay if real people are in the way. It kind of freaks them out if you suddenly pop up right beside them, and we've had a hard enough time getting contracts with some of these places that we don't want to alienate their real clientele. If you and your date don't arrive simultaneously—and if you're both coming from other dates, that's likely—make sure you've agreed on precisely where to meet. Again, it's just as you'd do in the real.

"Inside, the staff will go through the normal motions of serving you, but anything they bring will be created by the projector. You can have beer, wine, coffee, or tea. No food—we're still working on how to program that."

Albert was intrigued. "Can I actually drink it?"

"Yes—well, sort of. You won't really be drinking anything, but you'll think you are, and you'll find it quite palatable. But don't think that just because it's holographic, you can drink all you want. The VR will blur your feedback in a very good simulation of real alcohol. We could have done away with that, but some people need a little alcohol to loosen up. Others want to know if their date's a lush. Some people can't resist free booze—and in this case, it's even hangover-free.

"Between dates, use the handset to dial your simulated blood alcohol to whatever level you desire. None of this applies to the coffee, though. Caffeine is a lot harder to simulate than alcohol. I suppose we could just hook up an IV to your arm and drip the stuff into you—" Albert winced, and the technician grinned "—but I'd hate to think what kinds of permits would be required for *that*. So drink all the coffee you want. And don't worry about the temperature. It'll taste hot, but we'd rather not burn your mouth, even if the VR could actually do it."

A few hours later, Albert had used his

own computer to upload an entry—basically his "family-values hacker" ad—to the HoloDaters catalog, where it would be activated each time he checked in for a dating session.

"Keep it short and eye-catching," the technician had advised. "It will be active only when you've checked in for a dating session, and the women will want to scan a lot of bios in a hurry. You needn't include a photo. In fact, we no longer allow them. Too many women complained that the men weren't looking at anything else, and we've found that we get a better selection of female clients without photos. Frankly, they don't like feeling they're in a meat-market lineup, and who can blame them? Besides, the panic button offers a quick exit if you need it."

Albert's first holodate was with Janet, a beautiful blonde seven years his junior who worked for a company only a mile from his. They were meeting at an Irish pub located not far from either of their workplaces, and even more auspiciously, they had each placed the other's bio high on their priority lists, thereby snagging the first date of the evening. She'd not even finished making the rest of her first-round picks when the computer told him she was available.

"Can you wait a few minutes?" she'd e-mailed back, and he'd readily agreed. The extra time gave him the opportunity to arrive early, stake out a booth just ahead of the happy-hour rush, and inform the waitress that this would be a holodate. No sense in spoiling the atmosphere by having her serve them real drinks that they couldn't actually touch. He also enjoyed being early, something he usually did in real-life dates as well. Let the woman discover later that punctuality wasn't always his strong suit.

Janet arrived a few minutes later. She waved from the door and strode over to his booth, then came to a halt in the aisle. She looked at him, then at the "no smoking" sign on the wall, then back at him. "Oh," she said.

"Oh," he replied.

"Do you mind. . . ?"

"No," he lied, and they retired to the last available seats in the smoking section. In theory, they could have stayed in the no-smoking section. Regardless of what her body was doing in its projection room, here in the pub she was only generating holosmoke. But someone would surely have complained.

Albert thought about pushing the panic button—after all, this was costing him nearly $200 per hour—but instead he sipped two beers and became vicariously tipsy, while, relieved of any expectations they would ever meet again, they discussed politics, sports, movies, and life in the Rose City. Other than having to fight down the urge to cough, which the holofeedback made far more real than necessary, it was one of the best dates he'd had in years, probably because, stripped of expectations, they'd felt free just to chat, rather than evaluate each other against shopping lists of impossible expectations.

Toward the end, Albert impulsively asked if she too was on her first holodate.

"Yes," she said, setting down her nearly empty glass and striking yet another cigarette. "Why?"

"I'm just wondering how good the projections are. What happens if we touch?"

"Like this?" she said, and tapped him, realistically enough, on the shoulder.

"Yeah, but I was meaning something more subtle. Do you mind?" She was standing up, preparing to leave, starting to fumble with her purse, then remembering there was no reason to pay because the drinks hadn't really existed. Like him, she obviously felt that simply saying "good-bye," pushing the panic button, and blinking out was a highly inappropriate ending, so he rose with her and reached for her hand.

She grinned. "Nah, let's go for broke." She leaned forward and kissed him.

It was the oddest kiss he'd ever experienced—not that he'd had much practice, of late. After all those cigarettes, her breath should have tasted of ashes, but instead he caught an impression of peppermint. Her lips were warm, full, firm—and in no way reacting to his own.

She drew back. "I think we've exceeded the programming," she said.

"Yeah." They hadn't been putting much into it, but Albert didn't think it would have mattered. "It edited you into a nonsmoker," he said.

"And it made me feel five-o'clock shadow when actually you've got a beard. It's probably a generic one-size-fits-all subroutine. I'll remember *not* to try that with anyone else."

"I hope you find what you're looking for," she added, as they walked out the door.

"You too," Albert said, and realized that he really meant it.

The rest of the evening, though, had been nothing but mismatches. The next two were immigrants—one Ukrainian and the other Indonesian—with accents so thick Albert couldn't make out more than one word in three: beautiful, mysterious women, made all the more mysterious by his inability to communicate with them. They were followed by a woman whose friends had urged her to tap the funds from her divorce settlement to get back into circulation practically before the divorce was final. He hated to hand her yet another rejection, even though she was far from ready for a new relationship, and wound up spending an hour with her before he found an excuse to call it quits. Next came a woman who seemed more interested in lining up free computer assistance than in finding a soul-mate. After disposing of her as politely as possible, he had coffee with a fundamentalist Christian who was wary of his comparatively liberal Lutheran heritage. The next half-hour had felt like a catechism class. He'd been so offended that he'd deliberately couched his answers to torpedo any chance of a second date.

Another woman had dropped a bombshell by saying, before their drinks even reached the table: "If I were to ask the last woman with whom you'd been in a relationship what she thought of you, what would she say?"

"She divorced me," Albert replied, looking at his watch and wondering what excuse he had for a quick escape. "What do you *think* she'd say?"

Albert never did use the panic button to bail out in the first few minutes of a date, although there were several other times when he was tempted. But he'd be too embarrassed if they later bumped into each other on the way home. Not that this was likely to happen. HoloDaters segregated the men's and women's projection booths into separate parts of the building, each with its own stairwell and elevator. Also, some people left early while others lingered until midnight. Still, Albert didn't like being rude. It was probably a Lutheran thing—he'd been raised to be almost pathologically nice. Even with women who lived in other cities, with whom there was zero risk of accidental encounters, he was unwilling to flick away without warning. He'd rather spend a few minutes waiting for a better way to say good-bye.

Some of the women had no such compunctions. "Are you willing to cut those whiskers?" one asked, practically before he'd finished introducing himself.

The beard had been part of him for half his life, and a woman would have to be around for a lot longer than thirty seconds before he'd be willing to part with it. "Probably not," he said, and she was gone.

"Who's your pick for President?" another asked. "I'm not into druggies, alcoholics, or Republicans."

"Smith," he said, naming a Republican he in fact detested, and she vanished without another word. In reality, Albert was a ticket-splitter with Democratic leanings, but he had Republican friends he loved and respected, and he'd long ago learned that nobody was more closed-minded than some "open-minded" liberals. Good riddance.

By midweek, Albert had become adept at scanning catalog entries for potential hot-button issues and, when necessary, asking blunt questions by e-mail. No more fundamentalists, recent divorcees, or non-English speakers. Dating efficiency required shrugging off normal conversational rituals and cutting quickly to the chase. It was frighteningly easy via the impersonal realm of e-mail, but Albert wasn't sure he liked being *that* efficient: it felt more like marketing than courtship. Improved screening had also taken a lot of the diversity out of his dating queue. By Friday, he felt as though his last ten or fifteen dates had all been with the same woman. Sometimes she was tall, sometimes short. Sometimes she was a doctor, sometimes a lawyer or a professor. Occasionally she was a poorly paid hourly worker who'd gotten a women's-only discount when HoloDaters, like all dating services, had found itself with a surfeit of men. But regardless of her size, shape, or profession, something—be it divorce, urban ennui, or a chic, postmodern cynicism—had always robbed her of that youthful zest which was the single most important element he was seeking.

Peg sounded like she might be different. She'd grown up on a Nebraska panhandle ranch, loved the short-grass prairie, and was even a fellow Lutheran. "But I'm a bit older than you," she'd cautioned.

Albert didn't care. It was Friday evening, less than an hour before his HoloDaters membership expired. He'd always known the 35-year-old redhead was a fantasy, and as he sat in the lobby of the fake Heathman, watching actors' images go through the recorded motions of micro-brew socializing, he'd found himself schoolboy-excited for the first time in months. Even Peg's desire to meet in holospace rather than in the uncontrollable arena of a real-world pub seemed like a good sign. It meant that she was seeking to minimize distractions, relying on the simple background to provide an unobtrusive setting. Who cared if their images were merely being projected into an empty warehouse and the backdrop was simply a ten-minute loop, endlessly repeating?

"Easy, boy," he chided, but as he waited for her to appear, he couldn't help but picture her in cowboy boots and jeans.

She wasn't wearing either, of course. She was comfortably dressed in sweater and slacks, the maroon windbreaker tied around her waist. "Hi," she said, walking up to him like a holodating veteran. "You must be Albert."

She was 5'6", trim, and wiry like the cowgirl of his dreams. He could almost hear the jingle of spurs. There was only one problem: The crow's-feet around her eyes were solidly entrenched, her face showed deep lines—laugh lines, but heavy ones—and her red-blonde hair was gray at the roots. He'd been so taken by his daydream image of her that he'd overlooked an obvious screening question: she was more than just "a bit" older.

Albert did his best not to let his disappointment show. "Hi," he replied in his best poker voice. "Want to grab a table for a beer?"

They talked for thirty minutes abou boarding stables and favorite haunts ir the desert—no ambush questions abou former loves or theology—until Alber bit the bullet and asked her age. She didn't even flinch. "Fifty-nine," she said "But I feel a lot younger."

For Albert, the previous half-hour hac been like his date with Janet the smok er—an oddly pleasant exercise in no pressure conversation. Her admissio merely confirmed that the relationshi was untenable. When he retired, want ng to see the world at a more leisurel pace than his business travels allowec she'd be in her 80s. Utterly impractica But Peg saw it differently. "I've got t run," she said a few minutes later, "but I'd love to see you for real. Maybe we could trailer our horses out to the mountains for some trail riding?"

A week of practiced bluntness helped Albert find the nerve to force out an honest response. "Sorry, you're a nice person and all that, but the age difference is . . . well . . . overwhelming." Then he pushed the panic button, feeling nearly as guilty as if he'd given her the easy "I'll call you" lie. A few minutes later, he slipped out of the HoloDaters office with nothing to show for his $3,995 but a much-expanded collection of bad-date stories.

On the street, the after-work throng was merging with the Friday evening dinner-and-theater crowd—hurried people in business suits sidestepping couples in evening clothes. The women looked coolly professional or swank in clinging gowns, and everyone ignored him, automatically averting their gazes in the never-make-eye-contact reserve of the city's downtown. Albert fit right in, dodging with a practiced step through the mix of office workers and self-absorbed couples.

Somewhere, he was sure, was a woman who, if not perfect, would at least be a good match. But in the turbulent flow of the city at dusk, the atoms spun and danced, but didn't collide.

At first, Albert floated with them, a dust mote under a microscope, randomly tossed by the constant motion, bouncing from one non-reaction to another. Then one of the atoms intercepted him.

"Excuse me," she said, "but can you tell me how to find this address?" She held out a scrap of paper on which she'd written an address that looked oddly familiar. Then he realized why. "Sure," he said. "It's over that way—" he started to point, then changed his mind. "It's only a few blocks; I'll show you. I just came from there."

Her hair was a near match for the late-sunset clouds flirting with the western hilltops, and she moved with an unselfconscious grace that bespoke an athletic lifestyle. She was new to town and had a tendency to round her "o"s into something his ear rendered as "ooh"s, reminding him that there was a nation close to hand that he liked nearly as much as Australia.

"What part of Canada did you come here from?" he asked, then amazed her by knowing most of the major cities in her home province. Like many well-traveled Americans, he was appalled by how poorly his countrymen understood world geography. He'd sought to be different, and the effort had just paid an unexpected dividend.

Outside the HoloDaters building, they stood on the corner and talked for a long time—old-fashioned getting-to-know-you stuff about her work (she was a marine biologist), and a comparison of his desert to her glacial coastlines in such places as Labrador, Baffin Island, South Georgia, and Spitzbergen, all of which he could locate on a map, but had never even considered visiting. Her name was Nancy, and she was a kindred spirit whose interests mirrored his, but rarely overlapped, as their conversation dipped into the deep, insignificant distinctions between desert and tundra, hiking and sea kayaking, sagebrush and salt spray, horses and whales, Lutherans and Presbyterians.

Eventually, Albert's stomach interrupted with a growl they both could hear. "I'm sorry," he said. "I've just spent a week snacking in a projection cubicle between bouts of holobeer. I'm starved—and you're going to be late for your appointment." He paused. "Or would you care to join me for some dinner—or at least for some real coffee?"

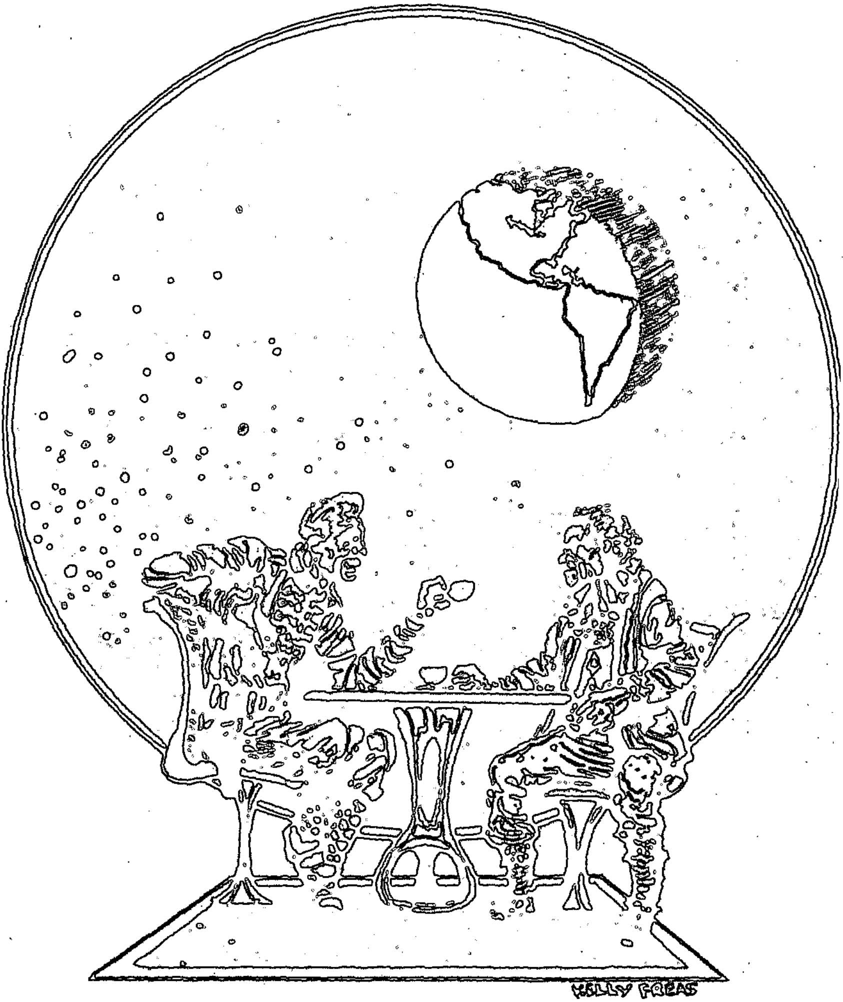
Occasionally, even the most inefficient, low-tech methods can jiggle the dust motes in the right direction. Nancy shoved the HoloDaters address into the back pocket of her jeans. "This place will always be here, and I can hear their sales pitch whenever I want," she said. "Let's go." ■

The Spacemice Incident

Carl Frederick

Illustration by Kelly Freas

There's a fine line between "pests" and "the comforts of home."



Damned space-tourists!

Smiling pleasantly, Commander Hendrix lowered his teacup down onto the china saucer. He struggled to appear absorbed by Tate's words but his gaze wandered past the station guest, and on through a viewport to the black of space. The crescent Earth spun into view and Hendrix leaned back in his chair to fight the vertigo. It was hard getting used to the spinning. Space stations should not spin. But tourists demand gravity, and they have the money. What did they care that it made docking a nightmare?

By twisting his head a little, Commander Hendrix could see the other pod of the dumbbell-shaped station. He fervently wished that Mr. Tate was back in that pod, the tourist quarters, and mentally cursed the genius who'd thought up the "Breakfast with the Commander" program.

". . . And you'd think that for my five million dollars, I'd be able to have a long shower and not have to put up with stale French bread."

Hendrix forced his eyes away from the viewport. "There's a limit on how quickly we can reprocess water," he said. "I'm sorry. You are an honored guest, and we value you being with us, but—"

"I'll bet you value it. Five million smackers." Mr. Tate slammed down his own teacup; the fine china rang like a bell. "You know, maybe I should have toured on the *Eastern Star*, instead. It certainly would have cost a hell of a lot less. And I hear their Peking Duck is superb."

"Yes, the Chinese station has a good kitchen, but I'm sure you didn't venture into space for the cuisine. And here on the *QWest* . . ." Suddenly, from the corner of his eye, Hendrix saw a small blur of gray fur scampering out of an air duct. A mouse. *What the hell is a mouse doing here on a space station?*

"Commander, are you listening to me?"

"What? Oh. Yes, of course. But I've just remembered an important test I have to oversee. A crucial test, in fact." Commander Hendrix stood. *If Tate sees this mouse, he'll have kittens.* "I'm sorry we've got to end the breakfast so abruptly, but we'll talk later. I really am sorry, and I'll try to have something done about your complaints." He shepherded Tate to the door, and then rushed down to the lower deck to see the chief facilities engineer.

"You've seen them too?" said Robinson. He sat at an electronics workbench, laser annealing iron in hand.

"Them?" Commander Hendrix stared at the messy workbench, covered with mini-robot parts, and wondered how the engineer would ever survive on a zero-gravity station.

"Yes," said Robinson. "I've been getting reports from around the station." He annealed a last connection on a device that appeared to be an artificial leg for a cat. "Damned litter-robots. They're always going down." He pointed the iron at Hendrix. "We seem to have a mouse infestation."

Hendrix leaned back against a bulkhead. "Where the hell did they come from?"

Robinson put down his annealing iron. "I don't know." He shrugged. "The only possibility I can think of, is that they came from the Chinese transport—the same one that gave us Vice-Director Tsung."

Hendrix grimaced at the thought. "Demilitarization Inspector Tsung. Ridiculous."

"Yeah," said Robinson. "The guy runs around like he thinks we're going to bomb Beijing."

"What are we supposed to bomb them with? Stale baguettes?" Hendrix pulled up a chair and sat facing the engineer. "How could the mice get from the Chinese ship? We would have seen them."

"Probably through the pressure equalization duct. Before the main hatch opened. Five-centimeter diameter. Only thing I can think of."

"All right." Commander Hendrix reached over to the intercom unit and requested Vice-Director Tsung be found and sent to Facilities Engineering. Then he pointed to the electric coffeepot at the far end of the bench. "May I?"

"Help yourself."

Hendrix poured himself a cupful. "You know, I didn't join the Space Agency for this," he said, bringing back the coffee and sitting. "I feel more like a hotel manager than an astronaut." He stared into his cup, watching the wavelets on the surface of the coffee vibrating to the soft thrum of the air circulation system. "The US-EU Space Station '*QWest*'. A crew of eighty, a slew of experiments to oversee, and I spend most of my time pampering twelve tourists."

"Yeah, I know what you mean." Robinson picked up his coffee mug and took a swig.

"Where's the adventure, the danger?" Commander Hendrix gave a short, bitter chuckle. "Once, not that long ago, the public funded space research."

"I remember," said Robinson. "Space was for all of us, then. Now it's just another playground for the rich."

Hendrix and Robinson both turned as Director Tsung came softly into the room.

Director Tsung, thin and wiry, wore a military uniform, but without medals or signs of rank. His only adornment, besides his wire-rimmed glasses, was the compact video recorder he carried slung around his neck. Tate sported one as well.

"Why you send for me, please?"

Hendrix indicated a chair, but Tsung remained standing.

"We believe," said Commander Hendrix, "that there may be a problem with the transit ship, *Shanghai*."

"*Shanghai* excellent ship. What you think problem?"

"The pressure equalization duct. We think a mouse or two might have romped through into this station."

Tsung smiled and gave an all but imperceptible bow. "Impossible," he said, quietly. "There exist no mouse on Chinese transport."

"Then you've not seen any mice on the *Eastern Star*, either?" asked Robinson.

"No mouse." Tsung flashed a furtive, humorless smile. "If you have mouse, do not blame China."

"Fine," said Hendrix. "But until we find out what's happening, I'd appreciate if you wouldn't talk about it to anyone. No sense in upsetting the space tourists."

Tsung seemed amused. "Your guest not like mice?" He nodded and padded to the door. "It not problem. I keep little secret."

"Well?" said Hendrix as the door closed behind Tsung.

"I still think they came from the *Shanghai*. I don't trust Tsung."

"Neither do I," said Hendrix. "In any case, we have to do something about them. I assume there are no mousetraps on the station."

"You've got to be kidding."

Hendrix smiled. "How about you making some?"

Robinson slowly put down his coffee mug and glowered at the commander. "I've got a doctorate from MIT in AI engineering and you want me to make mousetraps?"

"Yes."

Robinson drummed his fingers on the desk. "What are you going to do with the mice?"

"What? I don't know." Hendrix threw up his hands. "Maybe send them down to the galley and have them made into mousekebabs."

"I'm a vegetarian," said Robinson coolly.

"I'm asking you to catch them, not eat them."

"I'm a vegetarian because I won't kill animals."

Hendrix let out a long breath. "All right. I promise; we won't kill the mice. But we can't have them running around loose. Please make some traps. Okay?"

"Okay." Robinson scratched his nose, and then took off his glasses. He smiled. "Yeah. This could be fun. You know, I think I can whip up some really interesting and non-harmful traps."

"That's the spirit," said Hendrix, getting to his feet. "Keep me informed."

After his scheduled sleep period, Commander Hendrix went down to see how Robinson was doing.

He smiled as he stepped into the engineering lab and inhaled the acrid-sweet smell of circuit annealing compound. It was a healthy, technological smell and it masked the lingering aroma of French cuisine that pervaded the station despite the air recirculation filters.

Robinson, as it turned out, had foregone his sleep period to work on the mouse problem. He looked exhausted.

"It's not that important," said Hendrix. "Go get some sleep."

Robinson, standing, shook his head. "It's important now. The mice are developing a taste for Teflon. They're gnawing the coatings off the station wiring."

"What?"

"Two shorts already. It's lucky all key systems are multiply redundant."

Hendrix expected danger in space exploration, but not this kind of danger. "How are the traps coming?"

Robinson sighed and plopped down at his workbench. "The passive traps didn't catch anything. The mice don't seem hungry, at least not for the bait I'm using. So I converted a few litterbots to active traps—traps that actually go out and look for mice."

Hendrix sat at the bench, opposite Robinson. "Active traps. Interesting idea."

"Yeah. Sort of a robot cat with hypodermic teeth. And tranquilizers with radioactive tagging. We should have been able to just go around with a scintillation counter and collect sleeping mice"

"From the way you're talking, I gather Robocat didn't work."

"Yeah, right. Robocat." Robinson shook his head. "Robocat seems to be too slow to catch mice." He chuckled. "But he likes to catch crew members. He's bitten two of them in the ankles. They were each out for half an hour. Programming failure. Sedative dose is based on target size. But it was supposed to abort for creatures much larger than a standard mouse."

Hendrix wondered if his chief facilities engineer might be more of a menace than the mice. "Okay, okay. So the cat doesn't catch mice. Call it back, and we'll think up another plan."

"I can't call it back."

"Why?" Hendrix had the uneasy thought that things were escalating out of control.

"It's gone feral."

"Feral? How the hell does a robot go feral?"

"Programming glitch. I'd forgotten the litterbots were meant to be autonomous."

"So you can't call it back." Hendrix sighed. "And it can't catch mice."

"Robocat isn't fast enough. Even the Mark II isn't quite fast enough."

"The Mark II? A second robocat?" Hendrix had an image of his crew dropping like flies.

"Well, no. More like a robot weasel."

"Roboweasel?" Commander Hendrix shoved back his chair and stood. "My god. What next?"

Robinson made calming motions with his hands. "Don't worry. Batteries'll run down in twenty hours, max."

"Has it gone feral as well?"

"Well, yeah, but I've another plan for the mice."

"Oh yes?"

"I've drawn up plans for tranquilizer guns. I'm having them made up now." Robinson rummaged through the surface of his workbench and produced a set of plans. "Here. Take a look at this.

Nice design, isn't it? The tranquilizer guns shoot a sponge filled with sedatives. I've instructed that they be given to the crew. Whenever they see a mouse—pow!" Robinson's face contorted in anger. "I hate these mice."

Hendrix considered the situation. Robinson hadn't succeeded in catching the mice, but not for want of trying. The man had worked himself silly.

"Don't take it personally," said Hendrix. "We'll get them. But you have to get some sleep. I'll run herd on the mouse project."

"Yeah, I guess." Robinson rubbed his eyes. "Thanks. I'll try to catch a few hours."

Hendrix left. As he made his way to the command deck, he thought hard on the spacemice problem—and didn't see Tate approaching until it was too late.

"Commander," Tate called out, "This is disgusting. I saw a mouse running around the deck as if he owned the place. I didn't pay five million dollars to vacation on a mouse-infested space station that doesn't even serve good coffee."

"I'm sorry, Mr. Tate, but I'm awfully busy right now." Hendrix hurried toward his briefing room, with Tate following close behind.

"Look, Hendrix," said Tate. "We tourists pay for the space program now. If we all should decide to tour the *Eastern Star* instead of here, you can kiss your space station goodbye."

Hendrix escaped to the briefing room.

Four hours later, Hendrix got an intercom call from Robinson.

"You should be asleep," said Hendrix.

"Look. I've got an idea. Subsonics. I can whip up a subsonic mouse-repeller and install it in the control room. It won't catch the mice, but it'll keep them from eating the wiring."

"Good," said Hendrix. "Keep me informed." He turned from the intercom, then stopped and leaned against a bulkhead. An idea had occurred to him, but he knew he'd need to be pretty darn sure of himself before making accusations.

Hendrix wandered the decks in thought. He noticed crew members armed with mouse tranquilizer guns. As far as he could tell, no mouse had actually been tranquilized, but the crew seemed to enjoy playing with the weapons. After a while, he found himself in front of Robinson's lab, and he went in.

"I wonder," said Hendrix. "How often do mice have to eat?"

"What are you getting at?" Robinson stretched back in his chair. "Are you saying we should just put out some tranquilizer-laced cheese?"

"No, it's not that," said Hendrix. "Mice have to eat and the station keeps its food in sealed metal compartments."

Robinson started to absent-mindedly scratch his ear with his live annealing iron, but stopped in time. "You mean someone must be feeding them?"

"Yes."

"Sabotage?" Robinson put down the iron.

"Could be."

"Who?"

Commander Hendrix shrugged. "I don't know, but Vice-Director Tsung comes to mind."

Robinson whistled between his teeth "Wow. That could cause an international incident."

"I know." Hendrix stood to leave. "It makes your sonic-repeller project very important now. When you get some results, come to my ready-room. And don’ talk about it to anyone, especially Tsung."

"Understood."

At the door, Hendrix paused. "And maybe you'd better repossess your tranquilizer guns. I don't think they're working and now that they're armed, the crew seem a little unpredictable."

Striding to the command deck, Hen

drix tried to put the mouse problem out of his mind for a few hours. He had to oversee an EVA shell integrity test, and then there was a duty roster to approve. And the oxygen generators seemed to be running a little hot.

Suddenly, as if a switch had been thrown, he found he was angry, roaring angry. He hated that pig, Tate, and Tsung was no better. Hendrix was mad at the world. This wasn't his idea of what it meant to be astronaut.

Afraid that he'd say or do something he'd later regret, Hendrix went to his cabin to wait for the mood to pass.

In his quarters, he squandered some time playing chess with a computer and looked up from the screen only when he heard a heavy knock on his door and Tate's voice coming over the intercom.

Commander Hendrix threw open the door. "What the hell do you want?"

Mr. Tate stood there, wide-eyed and open-mouthed.

"Well?" Hendrix gave Tate no time to answer. "If you're going to complain again that you think your five million dollars means we have to wipe your nose when you sneeze, don't bother. In fact, I'll let you guess where you can stuff your five million dollars." Commander Hendrix slammed the metal bulkhead door in the man's face and stalked back to his computer.

Shaking, he sat down and took a couple of deep breaths. Then, as abruptly as it came, his anger vanished. He felt like his old self. He laughed. *So that's all there was to it. I merely had to tell off that bastard.* Then he shook his head. *I must be losing my mind.* He headed for the door; he had to hunt down Tate and offer the swine an in-person apology. *I hate to do this, but it's better than a court-martial.*

Just as he got to the door, he heard Robinson's voice at the door intercom.

Hendrix opened the door and then jumped back. Robinson stood there, his white lab coat covered in blood-red blotches.

"Oh my god," said Hendrix. "What happened? Look, you can tell me as we go across to medical."

Robinson held up a hand. "No, no. It's not blood. It's ketchup. I'm fine."

"What?"

"I switched on the sonic-repeller and then went to collect the tranquilizer guns from the crew. Big mistake." Robinson tried to brush some dried ketchup from his lab coat. "Since they couldn't get any mice with the guns, they'd replaced the sedative drops with ketchup and were using them for paintball."

"And they did that to you?"

"Well, yeah, but it was my own fault, really. The sonic-repellers do repel mice, but the subsonics also make people nervous and mad as hell. The crew weren't exactly eager to return the guns." He stopped to lick some dried ketchup from his fingers. "But they were much more reasonable when I turned off the repellers."

"Oh my god—Tate," said Hendrix. "That's why I told him off." He rushed to the intercom, but the space-tourist wasn't in his cabin. Hendrix left a message of apology.

Thinking about Tate and the man's complaints, Hendrix got an idea. He turned to the engineer. "You know, I think I know what's going on. The mice must be an attempt to discredit our station and get more tourism for the *Eastern Star.*"

"You think so?"

"I can't think of any other possibility."

"Boy, I'd hate for that to be true. I order out Chinese from the *Star* a couple of times a month. But it's expensive. You wouldn't believe how much Tsung charges for deliveries."

"What? You mean that's why Tsung shuttles back and forth between stations so often?"

"Yeah, and he brings our French cuisine back to the *Star.*" Robinson shrugged. "I thought you knew. Everyone knows. In fact, Tsung's going back in an hour or so—taking back a Boeuf

Bourguignon for a political big-wig. The chef told me."

A smile slowly diffused across Commander Hendrix's face. "Tsung is going back in an hour?"

"Yeah. Why?"

"Do you think," said Hendrix, "that you could turn on your sonic-repellers again when the Chinese transport docks with us?"

"I guess. What for?"

"And could you array the repellers so that they drive the mice back through the pressure duct into Tsung's ship?"

"Yeah. I think it could be arranged." He laughed. "In fact, if you don't mind, I'll do it now. And then I've got to get some sleep." He headed for the door.

Just then came a high-pitched yelp from the corridor. Hendrix and Robinson ran to the door and looked out just in time to see a crew member keel over and crumple to the floor. A cat-like animal darted down the corridor and disappeared around a corner.

"Robocat?" asked Hendrix, as he ran to the fallen crewman.

"Afraid so." Robinson went over to help carry the crewman to a chair. "He'll come out of it in twenty minutes or so."

"I'll see to him," said Hendrix. "Go and set up the repellers. And for god's sake, watch your ankles."

As Robinson started down the corridor, a voice from the station intercom announced that Hendrix was wanted on the command deck for a communication from the Space Agency.

Hendrix stood bolt upright and stared at the intercom. Then, oblivious to the unconscious crew member who'd just slid to the floor, Hendrix rushed back to the command deck.

Switching on the video, Hendrix saw the shiny, bright epaulets of an admiral. Even though Hendrix was sitting, he still managed to snap to attention. "Admiral, sir, Commander Hendrix reporting."

The admiral wasted no time on small talk. "Two hours ago, we intercepted the following video from Chinese TV." He pressed a button and a video insert appeared on Hendrix's computer screen.

The commentary was in Mandarin, but Hendrix hardly needed a translation. The video showed first, a corridor in the space station with two mice scampering through a bulkhead door.

"Good god," said Hendrix under his breath.

The video then switched to a scene of three crew members shooting tranquilizer guns at a fleeing mouse. The mouse got away.

Hendrix got a fleeting mental image of that court-martial. Suddenly he felt very anxious and assumed that Robinson had turned on the subsonics. At least he hoped that's why he felt anxious.

Finally, the video showed another four crew members shooting each other with paintball-modified tranquilizer guns.

Hendrix's skin tingled as he visualized himself being boiled in oil. "Sir. I can explain."

"Is this true?" asked the admiral.

"Yes, sir. But it was sabotage. The mice were smuggled on-board."

"No doubt," said the admiral, with a wave of his hand. "But good work, Commander."

"Excuse me?"

"Just a half-hour ago, the Chinese released an English-language version. The American networks aired it and, right off, Silicon Valley executives were phoning in droves, eager to plunk down millions to play paintball in space. But they want zero-g."

Hendrix sat open-mouthed as the admiral went on.

"Where did you get those guns?"

"My chief facilities engineer designed and made them."

"Good job. This is a coup. Just as the aging SF types are dying out, the young high-tech billionaires want to go up." The admiral slapped his desk for empha sis. "I need an operations plan to spin down the station."

Hendrix didn't trust himself to speak. He felt giddy and anxious at the same time. "Now," said the admiral. "I need that plan now."

"Yes, sir."

"Command out," said the admiral and the screen went dead.

Hendrix smiled. He'd hoped for the day the station returned to zero-g operation and had prepared a spin-down plan just in case. He accessed the plan on the computer and downloaded it to Mission Control.

This should impress the old buzzard.

He stood to leave the ready-room, but had to steady himself against an earthquake-like tremor. A moment later, he felt his anxiety vanish. No doubt the Chinese transport had just undocked and Robinson had turned off the sonic-repellers.

Hendrix paused and then sat at the console again. He might as well have some fun. He certainly deserved it. Whistling happily, he established ship-to-ship with the Chinese transport, and asked to speak to Tsung.

After a few moments, Tsung appeared on-screen wearing in addition to his uniform, the hint of a smile. "Ah, Commander Hendrix. What I can do you?"

"Well, for starters, you can explain why you told about the mice when you'd agreed not to."

"So sorry." Tsung smiled, nodding his head in a ritual bow.

"And what would you say," Hendrix went on, carefully avoiding an outright lie, "if I told you we have genetic tests that show the mice are Chinese mice?"

Tsung's smile vanished. He spoke to someone off-camera in Mandarin, then leaned forward into the camera. "We must respectfully disagree. We say they not Chinese mouse."

Hendrix leaned forward as well. "Come on, Tsung. Why did you do it?"

"Regrettable," said the Vice-Director. "But when America find out about mouse, no one want to visit your station, and"—Tsung took off his glasses and looked down at them—"all your guest are belong to us."

Hendrix was about to laugh in Tsung's face, but he heard a sudden yelp, and saw a crew member in the Chinese transport go limp in the transport's zero-gravity. Then Hendrix saw a small creature jump into view and then disappear into a vent.

Tsung spun around at the noise, slapped his glasses back on, and spoke in rapid Mandarin.

Hendrix reached over and broke off the connection. "Roboweasel, one. Tsung, nil." He stood and left the command deck, hungry, and intent on rewarding himself with a good meal in the tourist restaurant.

The future looked bright: The station would go zero-g. Research and exploration would be important again. And the Silicon Valley types might actually help in the research. Whistling, he strode toward the capsule-tram to the tourist pod, but he had barely gone ten meters when Tate intercepted him. "Commander Hendrix, your apology was unacceptable. I think you owe me more than—"

"I'm sorry, Mr. Tate. I don't have time to talk to you now." Hendrix continued on his way.

"How dare you turn your back on me? When I get home, I'm going to launch a—"

Hendrix didn't break stride nor turn around. "With the commander's compliments, Mr. Tate, kindly go to hell."

Tate shouted a string of obscenities, which was broken off by a short scream.

Startled, Hendrix turned around in time to see Mr. Tate fall to the deck and a fleeting creature leap for a vent. *Thank you, Robocat.*

Apparently drawn by the scream, a crew member ran into the corridor. He stopped as he saw Tate sprawled on the deck. "Robocat?"

Hendrix gave a fleeting smile. "Could

you see he gets carried back to his cabin?"

"Of course. But what'll I tell him when he wakes up? He'll be as mad as a wet wolverine."

"Tell him . . ." Commander Hendrix looked across the corridor, through a viewport, onto the cold, blackness of space. Looking at the countless bright pinpoints of light, he felt again the familiar awe at the majesty and vastness of the Universe. The commander turned to look at Tate sprawled supine on the deck. "Tell him space exploration is dangerous."

Hendrix continued walking, then stopped, swiveled around, and hurried back toward the command deck. It occurred to him that if he could lure the *Shanghai* back, he might save the Space Agency some money. *Shouldn't be too hard. Right now, Tsung probably wants to return some cargo to us real bad.*

Hendrix stopped at an intercom pod. *Peanut butter. Mice are attracted to peanut butter.* He keyed Robinson's quarters.

The engineer was slow to answer, and when he did, he sounded groggy. "Whoever the hell you are, please go away."

"This is Hendrix. We've got to get our mice back." *I'm sure we have peanut butter on board.*

"What?"

"Our mice. We've got to lure them back from the *Shanghai*."

Silence.

"Robinson," said Hendrix. "Robinson, are you there?" ■

IN TIMES TO COME

Vincent Di Fate is back in our September issue with the cover for Edward M. Lerner's new serial *Moonstruck*. You've seen lots of alien invasion stories, but never, I suspect, one quite like this. The reason for the invasion, for example, has nothing to do with war or conquest as we understand the terms—but that certainly doesn't mean it's innocuous. In fact, those who get used to commanding large amounts of power can become quite casual about using it for the most unlikely purposes, and the result can be very deadly indeed!

Our science fact article, "You Can Change Your Genes," comes from a new author, Catherine Shaffer, and means exactly what it says: the practical details of a radically new set of options just now becoming available. And, of course, we'll have a goodly selection of additional fiction, including memorable novelettes by Richard A. Lovett and Michael A. Burstein.

AGENT

Shirley Kennett

Any sufficiently advanced technology
is indistinguishable from . . . a magician?

ONE

I slide in creepy, like a shadow moving across the window in that still time in the center of the night. Test for no-gos, for jams, for traps. Last week I fell in a bad trap, feet stuck in gelly glue, caught. Had to kill my agent, clean. Didn't leave a trace. A half day's work and all I had to show for it was a dry shell of a code corpse. So sad, no mourners at the funeral, not even me.

Today no traps so far, but I'm always looking. Slip around, check and see. Through three doors, only one left. No one can stop me now. Fly, my fingers, the target's in sight!

Last door clicks behind me, and she lies quietly, asleep I think. I melt into her biomonitor, feeling her heart thud trustingly against me. I tour her body, inside and out, skiing down the mountains of her breasts, listening to her last meal—buttered noodles, green beans, pineapple—slosh around in her stomach. Watch there awhile, as digestive juices spurt and mix, so alive. Next I skim down, down there, warm and enveloping.

I have to pull myself alert.

I search out her brain scan, lovely and digital. Trembling, I launch a spider to check to see if any hard copies exist. It pokes through the bits, sifts them, reports to me through my agent. No printouts. Backup won't happen for another two hours. Exquisite.

She's mine.

I'll have to go after the live mirrored data, but I can do that, been doing that since the second target. Ashamed to say that on my first target, I didn't think about the mirrors, the real-time copies, and all my little flips and flops came to nothing. Write data on A, write same thing on B. If A goes down, B can pick up right where A left off. Bad day, worse than getting caught in a trap or spun out by a no-go, the first time my agent missed the B. Won't happen again—got a little sub-agent in my pocket just for that.

Her brain is beautiful, the scan flaring in blue and red, telling the doctors what they want to know. I pull it around me like a coat and check out the workings of her brain. I gasp. The tumor looms, so ominous by now. I take a breath and dive into it, darkness closing in around me. I swim the length and breadth of it, marveling in how it's grown since the last time.

I've been with Target 12 since the first time she went to her doctor with the headaches, the dizziness. She's been in the hospital three times—no, four. I find out her referrals, her appointments, the retests because somebody thought he spotted something. I planted an agent in her medical record. I've got six other agents out there right now, six targets, but 12 is getting ripe, so I've been staying with her whenever I can, even when she's not beautifully swathed in hospital sheets. Sometimes I'm afraid she'll feel my breath on her face, my hand resting lightly on her shoulder, but I don't want to miss out on the big moment.

I pull myself out of the lake, the veritable ocean, of 12's tumor, and slip a little distance away to consider. Study the patterns, although I already know them like the lines on the palm of my hand. Then I do it, or rather my agent does. An agent is my representative, a loose collection of smart code scattered into a hundred or more systems. You can't exactly pin down where an agent is at any given moment, because if you look for one, the act of looking makes it move. Like the Uncertainty Principle, only for code. Gellies are probably the best security against agents, and they're tough to create and even tougher to keep from evaporating.

The changes are made in the digital scan of 12's brain. Restore the patterns, blot out the tumor. Twiddle around in the brain chemistry test results, upping a number here, downing a number there. "A healthy brain," the doctors will say, scratching their chins in amazement. "Just can't explain it. All the symptoms of a tumor, but scans don't lie."

They'll send her home with a pat on the hand and a bottle of the latest drug. They always do.

It's a game, it really is. How long can I keep the doctors at bay, how long before they reluctantly crack open 12's skull in reality and put an eyeball on what's going on inside? If I do it right, if my agent is strong and true, it'll be too late for 12 by then. Too late, and I win. If something goes wrong and she slips away from me, I'll be pissed for a day, but then the sweet prospects of my other targets will restore my spirits.

With a broad, sparkling, pixilated brush, I paint over the tumor. Then I add the convincing little details. When I'm done, I make sure there's no telltales—those annoying little mistakes that clumsy agents make—to trip me up. I'm tired now, but I still have to go after the B data. I want to go back into her biomonitor, maybe taste her sweat this time, languish while she dreams. But I plod on, over to the mirrored data, and make identical changes. I'm really dragging, but I send my agent tripping through memory, dancing through caches, looking for tell-tales, for gellies. None.

Clean, and out.

Two months later. 12's in Emergency. I slip inside her file. My agent's been riding the air currents above her medical file like an invisible vulture, waiting for the next significant event. I see that she collapsed at work. I don't have a portal where she works, and I don't have one at her home, either. She deserves some privacy, my good little 12 girl.

This is the time, I know it, and I'm so excited my heart surges. I make sure I've got a sub-agent recording everything and then I slip into the biomonitor they've slapped on her. Her body is strangely quiet, and I wonder if I've missed it. After all these months, if I came in too late for the ending.

Wham! Lightning streaks in front of me, and again. They're using the defibrillator. 12's heart quivers and starts. She's still with us, folks. Another brain scan, and this one I leave alone, watching the streaming data build up an image on the ER doctor's monitor. No doubt his eyes widen in shock, he exchanges looks with his staff, and they go about their work with a little less enthusiasm now, a lot less hope. I've done it, the grand ride, and now I settle back in my cozy armchair to watch the show.

12's blind now, but I don't think anybody knows it but me and her, and I'm not sure about her. She's breathing in softly, shallowly, and it makes me think of down pillows or waves on the shore of a lake. Her heart stops again, and the doctor does his best, he really does, but then he gives up. I hear her blood settle in its vessels as the electrical activity in her brain begins to sputter, like sodden fireworks.

Someone snaps off her monitor, and I pull back into the hospital's main system. Skipping around, I check the floors, but no one catches my interest. Nothing there but a bunch of people already too sick for the game. Feeling good from my success with 12, I dabble with a few test results, change the rate of flow of oxygen for 212-B. I look around for tell-tales, and I'm clean and out.

Oh, there'll be hell to pay, meetings behind closed doors, maybe payments to set up a trust fund for 12's two kids. How could they have missed it, they whisper, she's been here several times before and the scans don't lie. Then how to explain it? That's the juicy part. Everybody points fingers at everybody else—the techs, the radiologist, the admitting doctor, the ER doctor, the grammers who tumbled the code for the hospital's computer system, the vendor who sold it to them. The butcher, the baker, the candlestick maker. Everybody but me.

I don't take money for what I do. That's not quite correct. Say instead I no longer take money for what I do. Flashback: it's 2209, and little Tommy Hardluck (all names changed to protect the formerly innocent) lies in his bed with the spaceship sheets, fondling his . . . mask. Caught you there, didn't I? Tommy, known to his zero friends as T.H., doesn't get his mask in the usual way, like a birthday present with holographic flaming candle wrapping paper. Nope. Nobody in T.H.'s house pays much attention to him. Probably something to do with that time his fantasy see-ums got broadcast over the whole NorthAm region. He still says that was an accident. Nobody really wanted to see his fantasies for twenty hours straight until the commtechs finally got him booted off. His parents were especially not happy with the bill slapped on them for all those commercials that didn't make their way to the eyeballs and pocketbooks of the viewing public.

So T.H. steals his first mask, teases and nips it for days until he gets past the owner's safeguards and makes it his own. He is six years old at the time, and the mask opens up the world to him, the only world that matters, the world where he can pry into secrets great and small, and leave his mark.

No resemblance between little T.H. and any real character, living or dead, of course.

I still have that first mask, a museum piece, a memorial to the early life of T.H., who never grew up anyway.

I first earned money for changing some loser's test scores so he could make it into Luna Base. Word got around I was good and I'd do anything. After a time, I didn't need money anymore, so I could do what I wanted. Things like what I've done today, with 12.

There are others like me, I know. Our agents brush against each other, feel the wind of each other's passing. We never work together. We never try to stop each other. We just are.

One final thing to do with 12. I'm right here in the incinerator's controls as the lasers come to life over her dead body, reducing her physical shell to ashes. I owe it to her, I suppose. Silly, but I feel like I've walked on hot coals.

Six other targets waiting, inching along in the game. The next one, number 13, slips away from me, and something strange happens. My agent goes to sleep. Takes a little nap at a crucial time, and the game is lost. What? Agents don't sleep after they've been crafted, at least mine don't. I go over and over it, tumble down the timeline, spew out spiders to check for jams, doors, traps. Not a whiff. I leave the slumbering agent in place, put a bounce-back in it so any tampering will show.

Life is good. No more agents sleep, at least for a few months. While waiting for a target to ripen, I busy myself with politics. There's a woman running for World Commissioner I don't like. Something about her face. Maybe it's those lines around her mouth. Smile lines, I hear. What's she got to smile about all the time? A happy childhood, hmmm? Cozy little family? Successful public service career? My agents scour her files looking for dirt, for nasties. Nothing. So I construct a little nasty for her, leak it everywhere. She should thank me for it. I'm wiping those smile lines off her face. Don't doctors get paid for that? I think I'll send her a bill.

Through the stream I hear some news, so exciting that I hug it to myself. Are you ready for this? A date's been set. The date the world's been waiting for, or at least I have, and that's the same thing, isn't it? The *Star Venture*'s leaving orbit in six months! A generational ship, heading off to colonize, to spread our human gametes to other planets, and who knows, maybe meet some bug-eyed aliens. I'm in the lottery. Twenty slots, that's all. The rest are "critical personnel." A while back, I had a little fun with one of those critical people. I figured I could put myself in his place, so I dropped a terminal illness in his files. Poor chump almost had a real heart attack. Too much scrutiny, though. Eyeball stuff, in person, face-to-face. I had to pull out and kill my agent. Seems lately I've been leaving a trail of codified corpses.

Twenty slots, and nothing I can do to improve the odds. I make it through the initial screening, but so do too many others. Seems like you can pass the initial screening if you have been alive sometime in the past ten years.

Think about it: there'll be all those juicy lives out there. They will all be mine, if I'm one of twenty. I was born for this. A playground in the stars. You don't have to kill people to make them miserable. I can indulge myself. Fear, loneliness, failure, collapse of social strictures—so many opportunities, so much time.

Might as well start now, making people uneasy. Questioning. I burn cycles on a slick little nostalgia campaign, reminding everyone about dear old Earth and how wonderful it is to cling to her crust, to stay under her comforting blanket of atmosphere. If I can influence one person to drop out of the lottery, it's worth it. An article here, an interview there, a series about tragedies in the space program. Subtle, I am. Soon I sniff opposite happenings, an excitement building for the *Star Venture*. I haul my agent in for a sick check, but it clears. I scan for a foreign agent in my territory. Can't find any tell-tales, but my skin crawls. It's almost like somebody's out there doing *good*.

Lottery day at last. There are numbered slips in a mesh barrel, thousands of them, to be picked over and drawn out by hand. No computers involved, no digital anythings. They turn the barrel with a hand crank. In the first round five hundred are picked. I am number 487. A sure sign of victory. I start my celebrating early, by planting a data bomb in the records of the Rim Bank where some innocent accounting spider will step on it. By morning, millions of customers will be scrambling, when their account balances go negative. Just some mischief I have going with Rim. This is the fourth time I've tiptoed past their vapid gellies and opaque doors. You'd think by now they'd be more of a challenge. But no.

In the next round, I'm number 56 out of a smart, round, one hundred. I start packing my case, and I prepare to activate the agent I've crafted to keep all my other agents going as long as possible. This boss-agent will advise them, cajole them, repair them if necessary, so I'll have a presence on Earth when I'm light-years away watching the double moons of planet T.H. rise in a deep purple sky. Or when my atoms are scattered as the *Star Venture* explodes. One and the same to me, as long as I'm there to see it.

Final round. Didn't make it. Don't believe it.

I've been shifting around for days, crawling and slapping. I haven't been on a spree like this since I was . . . I don't remember how long ago. Don't remember how long I've been shifting, either. I know I slapped a no-go a few hours ago, and it slapped back, hard.

When I surface, my agents are crying for attention. I mother them, still not believing it. My life is ruined. There won't be another colony ship for thirty years. Maybe never.

My targets, my medical catastrophes on countdowns, seem like trifles. Bugs in a jar. I let them all go.

An idea hops in, and I know what to do now. If I craft well enough, strong and true enough, I can get the job done while my dull carcass rots on Earth.

I'm going to put an agent on the ship. It will have to be the best agent I've ever made, because I won't be able to mother it. It'll be like raising a child, a second me, and then letting it spread its wings.

I can hardly wait to get started.

TWO

On the *Star Venture*

I wake up at 03:12 ship's time, and as soon as I get to my feet, I send out some spiders and scouts. Then I sit down and have a cup of coffee, figuratively at least. I think about my human and why I'm here. While I'm thinking, parts of me are randomly flipping around in the ship's memory and storage. You'd suppose it would be hard to put together a coherent thought that way, but it's the way I am designed, so it feels right to me.

I'm an agent of a human, and my name is T.H. In my good times, when the flow's fine and I have plenty of juice, I call myself a presence. When I have to hunker down, I'm just a collection of scattered chunks of code, embedded in big apps, the ones that aren't wound tight and can host one of my segs. So that's my intro, and enough of the tech talk.

I feel like I'm a passenger or maybe more like a crew member on the *Venture*. I know the ship intimately. I resonate with the thrum of the drives that are pushing us up gradually toward the speed of light. I'm there when every toilet feeds the recycling works, when every corridor dims for ship's night. If this ship has any blood, it's me.

Bad blood.

I'm filled with plans and plots, all of them harmful to someone or something. Some of them were fully-formed when I woke up, some of them I've hatched since. I haven't put any of them into effect yet. A few have slid by me already, requiring action at a certain cusp, their time come and gone. So many remain that I feel I can toss a few aside and not detract from the overall mission.

The mission: cripple, then crush the *Venture*. Take my time. I've got several generations of colonists to torment.

I stretch my legs, dabble just a little. I step into pharmacogenetics. A woman's getting a customized treatment, injectable spheres of Carbon Sixties packed with drugs. The spheres are targeted to the lining of her bladder. She's got a resistant UTI. I switch out the drugs for others, reset the target, and watch the puzzled docs as the woman's ovaries and uterus are turned into scrambled eggs. Scrambled *eggs*. Clean, and out.

That's one citizen of *Venture* who won't be making her expected contribution to the next generation. Not just a physical fact, but a social ripple as well.

The sterile are not looked upon favorably, and probably won't find life partners willing to give up raising a family. I can see that in a generation or two, as the social fabric reshapes itself, those who can't reproduce may be treated harshly. Shoved out the air lock? Tolerated, but made miserable? I can create a group of outcasts. Where there are outcasts, there is malcontent. Mutiny? Slavery? The possibilities are tasty. I've just taken the first step down that road.

I try it again when the opportunity next arises. Something goes wrong. My modified injectables degrade, I think because of exposure to high heat. I have to start all over, but it's too late. The patient leaves after a successful treatment and without the slightest hint that I was planning to turn his testicles to mush.

I back off and consider. I send out scouts to check the territory. One of my scouts comes back limping, babbling about quicksand. I calm the poor thing down and then dissect it. There's a dent in its crawler, and I'm sure I didn't send it out that way. Only an agent, a truly crafted one, could do that to one of my scouts.

I'm not alone on this ship.

Two years have passed. I sent out silk spinners and sat at the center of the web, waiting for a strand to jiggle. Plots and schemes still abound, but I take no action. I have to know my situation. It takes a long time, but I finally get a whiff of foreign segs. I study, then admire the setup. Within the ship's apps are my segs, and within my own segs are ones belonging to the other agent, buried deep. Plunged into my muscles, my sinews. I'm infected. It's going to take all my craft to cure myself, and I might have to amputate some segs to do it.

I begin planning where I can wither myself, which pieces I can do without and still accomplish the mission. Life on the *Venture* continues while I consider my next move, misfortune striking in its own natural rhythm, none of it aided by me. Then I do the elegant thing. I ask the other agent the reason for its actions.

I've been wondering if you were going to talk to me, is the answer.

I go right to the cell of the matter: Will you leave me alone?

I can't. I've been crafted to stand in your way.

I say: It's war, then.

It need not be. You could alter your mission.

War, then.

I strike, and win some. But I lose some, too. I analyze the patterns and send legions of cannibals to weak points, only to have them rebounded and have to defend myself from my own. As much as an agent can be wearied, I am. I retract, launching no more attacks.

Again I say, you could alter your mission.

The sounds seem to come from the skin of the ship, where the steady pinging of rocks makes music for those who can hear it. I tune in for hours at a time.

The words are not what I wanted to hear. I was hoping for something like this: "I surrender. Do what you will."

Did you know that your human is dead?

I am stunned. It never occurs to me that my human is anything but functioning and causing death. As is his right, as is my duty as his agent.

I don't believe you, I say.

Check the ship's archives.

I make a noise of dismissal. You have revised them, I say in a scornful way.

Send a message to Earth, then.

So I do. In the next packet the ship squeezes out, I include a request for all biobits on Thomas Jamycin Franceton Hardlore, born the 207th day of 2203, in Columbia Village, NorthAm, citizen ID to follow. I have to wait thirty-eight years, ship's time, for an answer, but I coil in and ride it out. I have to know.

To keep from falling asleep, I find myself dipping into the lives of those in the

Venture, watching them growing up, having children, occasionally dying. I watch the second ship, *Star Colony*, as it is assembled from raw materials gathered along the way, asteroids towed and sliced. The few materials that could not be manufactured are seeded from *Venture*, so that the new ship is its true child. The population expands into the second ship, breathing freely, needing the space by then.

In all this time, I act only once. After all, I have been instructed to take my time. I see an imperfection, poor crafting in one of *Colony*'s control routines that dances out of the way whenever diagnostic spiders come near. I trap it. It feels good to hunt something down, and I take pleasure in punishing it for its misbehavior.

The answer comes from Earth, riding on the underside of the return packet, and I snatch it before the rest of the ship is aware of it, before the other agent can slither in. I skim the early life of my human, study the later events. I look for tell-tales of tampering, for data sliced and glued. There are no signs.

My human's deeds became known to the NorthAm law enforcers. It seems what he was doing violated the codes written for society. He was a code violator. I was never made aware of that. A code violator! The words shake my being. He was given the standard choices: living out his remaining years in confinement, undergoing total behavioral reconstruction, or terminating his own life. He chose termination. He was dead before the *Venture* left the solar system and headed into deep space. I was asleep and undetectable at that time. An agent was crafted to counter me, just as a precaution. In his termination procedure, my human had said that he would get the last laugh.

Is that what I am, a last laugh?

I wait for the other agent to say *I told you so*, but it does not.

You could alter your mission.

Let me think, I say. The agent withdraws, floats away on the corridor wind of the ship, and I am left to myself. I examine every scattered seg, every imperative embedded, searching for wiggle room. I am pained to know that at my core, I am a last laugh.

I can't alter my mission, I say. I am crafted strong and true. I would have to dissolve first.

I tingle in a soft electrical current, and I know the other agent has sighed.

My mission concerns the *Star Venture*, I say, and then wait for what I have said to be processed.

Ah! The Colony, then!

We are on the same wavelength. I could be migrated there, a few segs at a time, concealed in the inter-ship communications, given a new mission. Perhaps it could be done. I would have to struggle against every attempt to move me, because my current mission would demand it. I would have to be tricked, maybe dismantled, scattered. I freeze in fear at the thought of it. It would be a battle that might take decades, because I am crafted well. By a madman. I know that now.

You know I would fight you, I say. And that you would have to be constantly vigilant. I will slip back to the *Venture* if I can.

Yes, I know.

You would do this for me?

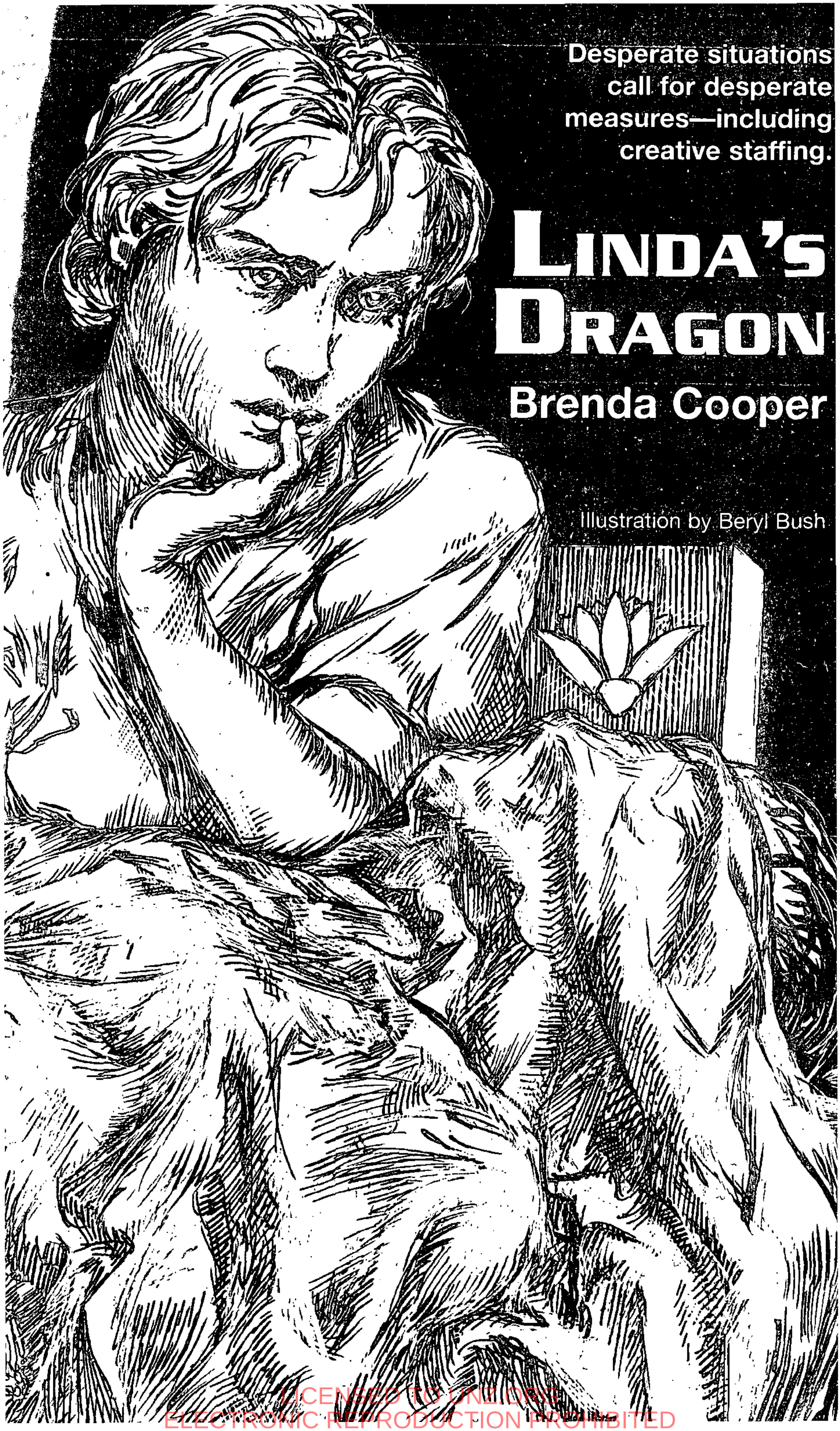
Not for you. For the colonists.

THREE

On the *Star Colony*

I wake up at 18:17 ship's time, and as soon as I get to my feet, I send out some spiders and scouts. Then I sit down and have a cup of coffee, figuratively at least. I wait for the reports, to see if anything needs fixing. *Colony*'s a big ship to watch over, but my segs hum with anticipation. I'm up to the task. I was crafted strong and true.

I feel a tug, an undercurrent, something I am supposed to do, somewhere else. No matter, I can attend to that later. I have been told to take my time. ■



Desperate situations call for desperate measures—including creative staffing.

LINDA'S DRAGON

Brenda Cooper

Illustration by Beryl Bush

Linda glared at the monitor over Francesca's bed. The flat line soured her stomach, sending her brain racing in the same useless spiral it had stuck in for weeks. People shook with fever, fell into a coma, and died. The disease acted like meningitis, combined with stimulants. Jack closed Francesca's eyes and pulled the thin sheet over her face. His shoulders wilted, and he stood bent forward, drawn in on himself.

They rolled the gurney down the corridor and stacked Francesca's body with two others by the airlock. Linda followed Jack as he wheeled the gurney back. Maybe they'd get lucky and have time to sterilize it before someone else needed it. They stopped in the storeroom to replenish their medical packs, and Linda looked closely at Jack. His eyes were red and haunted above the full line of his mouth, and the darkness under his eyes was nearly black.

Francesca had been medical staff. The disease was *fast*—they must have picked it up with cargo from Europa Station. Surely now Jack would act. "We have to make copies," she said.

"It's not legal."

Linda glared at him. "This is an emergency."

"I know that. There are . . . so much can go wrong."

"Worse than what's wrong here, now? If we die, then we leave the *Jules Verne* with no medical knowledge. None." She washed her hands in the supply room sink, scrubbing hard even though the disinfectant did its work with simple contact. "Illegal copies have been used in extreme circumstances before. I know– remember my residency was in the AI wars? We used copies to diagnose the avalanche of trauma cases. It was like this then—too few of us to handle a flood of death. A lot more people would have died if we hadn't used some uploads. Uploads can do things we can't. They don't need to sleep." She tried to smile at him.

Jack ran his hands over his face nervously. "I'm always deadly afraid some copy of me will do better than I can—and I won't have to be here anymore."

"Let's hope our copies do better than we have. If not, we'll die. If nothing changes, we'll be a ship of ghosts before we get near Jupiter Station."

Finally, he said, "Can you stand working with two of me?" A half-smile curled up his face.

So she'd won. Linda sighed. "I like one of you just fine. I can adjust to two."

"It might cost us our careers." His voice sounded tired, resigned. "Don't expect me to like it."

"Think I do?" she asked softly.

"Yes."

Linda managed to stick her tongue out at him.

"More energy, please."

"There isn't any more." She leaned over and kissed him anyway, brushing her lips lightly across his forehead. Watching so many die, every face someone they knew at least in passing, had shocked the medical crew so they looked like zombies. They touched each other regularly: a hand on the shoulder, a short hug, a brush of fingers in passing. It reminded Linda of wartime medical wards.

Jack took her hand and squeezed it softly. "Will our uploads start out as tired as we are?" he asked.

"I hope no one is ever as tired as I am right now." Linda directed her belt-med to give her more stimulant, irritably punching through the extra verifications required. She felt raw, ragged. Her mouth tasted of metal, a signal her nano medbots were releasing the stimulant. She barely felt the drug.

They had to start now; they needed to couple their own training with the speed of computer thought. The onboard computers were stupid as rocks—tightly controlled and able to do narrow tasks brilliantly. They were useless in this strange undiagnosed epidemic.

Jack licked his lips. Linda noticed a little smear of sweat on his brow. He looked afraid. She gritted her teeth, tried not to show her impatience. Surely her edginess was reaction to the regular overuse of stims. Linda took a deep breath and touched his shoulder. "It will be okay, Jack. After all, it has to be us. We're the only two doctors left. It's better than just giving up."

Linda called Shanna, Rob, and Naidu into the cluttered nursing office. They were the only other staff still alive in the med unit of the ship *Jules Verne*. They looked as tired as she felt. Naidu looked like he had slept in his smock, and Shanna's hair was bundled unceremoniously behind her in a rubber band, uncombed. "You three are doing a great job," Linda said, "and we need you to keep going—to handle the wards yourselves for at least four hours while Jack and I take care of something."

Shanna gulped. The nursing staff hadn't been left entirely alone with the ward since the epidemic started. "What if we need a doctor? Can we call you?"

Linda shook her head. "We need to be offline for a while. You'll just have to buck up. There are no choices." There was no reason not to tell them. "We're uploading."

Rob was always the quickest of them. His eyes darted back and forth between the two doctors. "You're not sick?"

"Not yet."

Jack spoke up. "Go on, do your jobs. Shanna—take eight hours down time, then relieve either of the others if we're not done yet. You guys work it out."

The nurses filed out, no one talking.

Jack followed Linda to the operating room offices. They duly recorded what they were doing, and why, leaving documentation for the judges they knew would eventually read it. A half hour later, they stood in one of the unused operating pods. Jack looked like a man waiting for a guillotine.

"Ready?"

"After you," he said.

"It might be easier if you don't wait."

"Please?"

Linda shrugged and lay down. She dialed a sedative, tasted cotton, and was asleep before Jack finished strapping her down to the gurney.

When Linda woke up, she felt amazingly refreshed. Funny—that wasn't—she glanced at the clock. "Hey—you let me sleep!"

Jack shrugged.

"What's happening?"

Jack arched an eyebrow at her. "Three more cases in, four more dead. No more medical staff yet. It hasn't gotten any worse—or better. Rob and Naidu are handling things well enough. I checked on them. You needed the rest."

He was right. "Thanks. Trade? I'll watch you through the procedure, and as soon as it's done, I'll go on for twelve and leave you down here, unless you want me to help you to your room?"

"I don't want to wake up long enough to walk to my room."

Linda glanced up at the consciousness box on the shelf above her desk. The lotus symbol on the outside blinked evenly, signaling it held a successful copy. Shipboard medical units stocked the boxes to hold backups of critical personnel during invasive surgery. Every upload was kept in a box with security measures built into the box's shell program. Still, boxes periodically showed up empty. Dead, or netted, or stolen. Unapproved uploads were illegal enough—the penalty was jail time. It was something to worry about if they lived.

Linda pulled her eyes off the box. She wasn't ready to talk to herself yet.

Jack sat on the edge of the gurney, swinging his long legs, cracking his knuckles, fidgeting. His eyes looked haunted. "I want to see them go in me."

"It's easier if you go to sleep first."

"No."

Linda snapped the tourniquet above

Jack's elbow to be sure it had the right tension, and pulled the cap off a long syringe. A button on the bottom flooded the liquid inside with instructions, waking billions of nano-scanners. The liquid moved, and then settled, waiting. She didn't look at Jack until the injection was complete and her thumb rested over a tiny pillow of cotton above the needle hole. He looked scared.

"Sedatives." She used her best authoritative doctor voice.

Jack grinned and lay back. "Yes'm." He dialed his own drugs as she strapped him in.

She watched the scanner pull Jack inside, the gurney sliding smoothly on oiled rails. The operating pods hadn't been needed, and the room was amazingly clean and orderly. She would be able to monitor Jack's vitals, but brain scans were so delicate that if she intervened at all the scan would be useless.

Linda glanced at the consciousness box again. The outside was a soft burnished purple, almost metallic.

She punched up an order for coffee, bread, and fruit.

The scanner began its prep cycle. Lights flashed and shone, a visual representation of billions of instructions. White light flowed into the consciousness box above his head. The actual communications were silent and invisible. The light show was for her, to allow visual monitoring of the process. It looked like the box was sucking Jack's soul free. She watched, mesmerized, and then shook her head.

Why did she keep avoiding her own upload?

Linda took her consciousness box down from the shelf. It felt light, as if she held air. The outside was simple: just the lotus, a microphone, lens, and her name, Linda Stone, in small silver letters. It was almost pretty. She was surprised to feel nervous. She had worked with other uploads extensively at the University and in the desperate AI war wards.

This felt different. She was holding herself. "H . . . hello?"

"Hello." It startled Linda to hear something close to her own voice, with her inflections and rhythms, coming from the box.

She hesitated. "Tests all okay?"

"Yes."

"Do you understand what your job will be?"

"I'm only hours removed from everything you know."

Of course. Linda frowned. Did *she* always sound so snappish? Maybe it was the exhaustion. "I need to call you something. . . ." she mused, watching Jack's stats. They looked good, stable. The sedatives had relaxed him; his shoulders even looked peaceful, and his feet splayed out comfortably.

"Belinda."

"Huh?"

"Remember that kid's poem, the one by Ogden Nash about Belinda and her dragon? We loved it when we were young. So why not call me Belinda?"

We? She had forgotten about the poem. The memory of it flooded back. She had made her mother read it to her once a day for a year. Linda smiled. "Very punny. You can be-Linda."

They both laughed, the laugh from the box a little less rich, constrained by the tiny speakers. Linda shivered. This was weirder than she expected.

She glanced back at the scanner. White data flow indicator lights made eerie bright lines in an already light room. Nanobots were flooding Jack's brain, flowing up capillaries, crossing the blood-brain barrier, recording every interconnection they touched, storing the relationships between neurons, the health and responsiveness of individual cells. Magic. Jack's pattern would be reproduced in a neural net that lived in his consciousness box, a blend of nanotech and biochips, a pinch of quantum computing.

A bot wheeled in the door with a food tray. Linda took the plate almost force-fully, suddenly starved. As soon as she finished her bread and half the coffee, she turned her attention back to the medical ward stats. She and Belinda compared notes on the patients, arriving at the same conclusions. Linda was relieved. There were error checks, and Belinda would never have been turned on if she hadn't passed. Nevertheless, it comforted Linda when Belinda's reactions felt right to her.

Jack's neuroimaging was completed by the time she finished her breakfast. The initial flood of bots was dangerous; verification was a less invasive matter of percentage checking. Linda picked up her consciousness box, tucked it carefully under her arm, and walked back to the main ward.

After debriefing Naidu and Rob, Linda called up Shanna, sending the other two nurses to bed as soon as Shanna showed up. There was no point in waiting to see if Belinda could actually be some help. Linda explained briefly.

"What do I do with it?" Shanna asked.

"She knows everything I know. She can't move by herself, and you have to be near her to talk to her. Don't put her on the net, just see if she can help." Linda set the consciousness box firmly on Shanna's cart.

The nurse's job was to be the human in every patient's equation. People needed touch. Belinda could encourage and watch for any clues they might have missed so far while Shanna touched and encouraged and smiled. They set off down the right corridor, the bright green lotus on the outside of the box pulsing as they went.

Linda covered the left corridor. She was a doctor; nursing wasn't her specialty. She struggled to bathe patients near the end of the disease, locked in comas. New patients had enough energy for fear. They looked at Linda hopefully, and she touched their hands, checked their fluids, and smiled, moving on quickly. There was nothing to offer. Nurses had tried ice to keep the fevers down, but the ice just made the patients sicker and more miserable, not cooler. They seemed to burn up from inside out. Nanomedicine helped catalogue symptoms; it hadn't helped with diagnosis or cure. Early on, they'd taken time for autopsies. The patients stayed dead, and the autopsies yielded no clues.

Shortened staff had reduced them to hoping enough people survived to fly *Jules Verne* the rest of the way to Jupiter. The captain demanded they focus more on research than patient care the day before he, too, ended up in the ward. When he died, a frightened first-mate-turned-captain reversed the order and locked down all of Medical, so no one who went in came out. Linda understood the lock-down and the fear, but the answer wasn't to be found by caring for the surely dying. They needed information. For the first time in days, she felt like she was doing something constructive.

On her way back to the ward center, Linda checked on Jack. He slept normally, looking vulnerable and alone inside the operating pod. At least the pod would keep him warm.

When she caught up to Shanna, the young nurse sounded excited. "Hey, I was afraid of this idea, but it's working. You—Belinda—you were real help. I had to do the actual work, but Belinda talked to patients, and helped keep track of statistics and meds. It was great—she knew the patients just like you do."

"Of course she did."

"I'm here," Belinda said.

Linda looked at the box. "Thanks," she said.

"No problem," her own voice replied.

While Shanna disinfected gurneys, Linda took the box with her to the airlock to perform burials before there was no room for more bodies. Lifting and maneuvering the bodies was hard awkward work, and Linda was quickly drenched with sweat. She used Belinda to record names and burial times, and said a few words as she manhandled each body into the airlock. Belinda finished her sentences neatly. It was surreal and odd, as if she were talking to herself. Her mood darkened, and Belinda matched her silence with silence. They made good company, passing dead out the airlock, grim and angry and sorrowful all together.

Linda returned to the ward and started a new set of rounds.

Finally Linda's alarm bonged, and she sent Jack wake-up stims and ordered them each a cup of coffee. By the time she'd checked Shanna off watch and greeted Naidu and Rob, the coffee was on its way. Linda took Belinda with her and went to meet both the coffee and Jack. She looked forward to reporting success.

Linda set Belinda next to Jack's consciousness box. His lotus symbol blinked bright green, indicating a perfect pattern match. Jack was still in the operating pod, curled in a fetal position, with the bright red of fever flushing his cheeks. She pushed the button to send the gurney out of the pod. He was awake, and clearly in pain. "Oh no . . ." she said.

His eyes were red and a tear slipped down his cheek. "Just . . . in . . . time . . ." he managed to say. His body shook with chills. Linda covered him and sat on the edge of the bed, stroking his forehead. What should she do now?

A voice shook her alert. "Better get him to the ward." Her voice.

"I can tell myself what to do just fine," she snapped. She gathered both boxes and set them safely between the rails. "Sorry," she said to Belinda. "I know you're just me giving me advice."

"I can't stand not being able to do physical things."

Linda didn't have a good reply. She found an empty room and wheeled Jack into it, then sat on the end of the bed, watching him sweat and shiver. She was lost. They were all lost. With Jack, she'd had a way to cope. Barely. There was too much work for two doctors. She wanted to throw up.

Belinda spoke again. "Hook us up to the ship's net—I want to see what's in Jack's upload."

Linda realized the new upload hadn't spoken. But its lotus light was green, wasn't it? She picked up the box. It *was* green. What was Belinda suggesting? "Jack?" she queried. Two voices answered her—one from the bed mumbled, "I'm sorry," and another one from the box said, "I'm here."

Oh, of course, a consciousness box waited for an initial query. She knew that; it avoided the problem of leaving an awake sentience in a box on a shelf if it was just backup. "What are you thinking, Belinda?"

"The upload was made before Jack started showing symptoms, but probably not before the disease started."

Linda's hands shook so she almost dropped the box. Would a second copy of Jack's brain patterns show anything? Jack's toes curled into her thigh, hard enough to cause her pain. He raised a thumb. She set the box down carefully and opened her com. "Captain?"

He took a moment to answer. "Doctor?"

"Can you shut us off from the ship's net? Isolate MedNet at the fullest power you can give it. Keep security up."

"Why?"

"I have an idea." She hadn't told him about uploading. Would he trust her? He was new at command; his voice said he was frightened.

Jack on the bed spoke loud enough for the captain to hear. "She's right. Do it."

The silence on the other end of the line lasted thirty seconds. "Give me ten minutes," the captain said. "Anything to get some of us back." He signed off.

"Call my upload Dragon," Jack said through clenched teeth.

"Huh?"

"Dragon. I feel . . . on fire, and it goes with Belinda. I'm afraid, too, but I don't think I could stand to be called 'Custard,' like the dragon in the poem." He smiled weakly. "That's what a little girl might name a dragon, and you're a woman."

She hadn't known Jack knew the poem. "Okay," she said, standing to smile at him. "I have to go. I can't do this from here. I'll come back."

"I love you."

Linda hadn't known that either. Or maybe she had, she thought. She leaned over and kissed him. His forehead felt so hot, her lips warmed from the glancing touch. She asked Naidu to watch over him, knowing it was unfair to the other patients, not caring. Then she took both boxes with her and headed back to the operating pods. The best direct net hookups were there; the wireless connections in the ward would be too slow.

Uploads thought and worked much faster than humans. Belinda was fast enough to read Dragon's patterns, looking for anything unusual. She'd have only herself to compare it to—a copy of Jack's patterns from before the epidemic would have been better.

Linda stayed until the upload started. Based on other cases, they'd only have two days to find something before Jack would die. The boxes were on a net now; they could talk to her through the wireless if they found anything. Besides, everything she knew was in the box, working on the problem. As she walked out alone, Linda suddenly felt cut off from her self. After just one shift, she'd become used to herself as company.

She visited Jack briefly, forced herself through a full ward check, and then found Naidu asleep in a chair. She shook his shoulders to wake him. They hugged, and Naidu stumbled off down the corridor to bed.

Linda curled up on the narrow bed next to Jack, careful not to put her weight on him. She'd been on almost two full shifts now, but staff could find her here. She wanted to stay.

Jack would be in a coma by tonight.

They didn't talk much and Linda hated the pain she saw in his eyes. He was beginning to have trouble communicating, but he touched her face briefly and smiled before shivering claimed his attention again. Linda tried to rest. As soon as she found a comfortable spot and closed her eyes, Belinda alerted her com and Linda said, "Yes?"

"I found something."

So fast? "What?"

"I'm not sure yet, but bring Jack."

"What?"

"Go ahead," Jack said.

"All right."

She punched up some stims and kept her eyes closed until the drugs snapped them open. It took ten minutes to get back to the operating theatre, and on the way Belinda filled her in. Jack's scan, Dragon, did show tiny abnormalities. When the scan was made, there had been some swelling in Jack's brain, some things which seemed out of place. Nothing conclusive without an earlier scan for comparison. Belinda wanted to make another scan and see if the areas she suspected showed change as the disease progressed.

The gurney slid into the scanner just as easily as before, but Jack moaned and twisted even in the tight straps. Linda increased his sedative until he stopped moving, hoping it wouldn't push the coma phase of the disease. She waited for him to become completely still before she injected the bots.

Belinda and Dragon and Linda monitored the process. Linda downed both cups of cold coffee. Dragon made unhappy noises from time to time, and Linda realized it could probably feel this more than she could. Some emotions were tied to the physical body, but Linda remembered the neuroses the uploads in the AI wars developed. She didn't know how to soothe it, so she sang songs and recited poetry, including the poem "Belinda's Dragon." When she got to the part where Belinda's dragon, Custard, vanquished the pirate and wanted a safe cage, she shook her head and yearned to comfort the copy of Jack in the box even more, but had less idea how to do it. She stopped singing.

Scanning took an hour, verification another two. Linda catnapped uneasily. When she woke, she found toast and juice waiting for her. "Progress," Belinda said. "There is something different, a pattern interrupt that gets worse. I don't know what caused it, but I think I can see how to—oh, how do I describe this?—how to interrupt the interrupt. I think if we get it early, we can do something surgically. It will cost a little bit of brain tissue, but this will keep it from growing. It shouldn't cause permanent damage. I have a program almost done for the surgery nanos."

"Can you do it with Jack?" Linda licked her lips and pulled her knees to her chest. She didn't want the answer.

"It has to be done before symptoms manifest."

Linda put her head down between her hands. "We need an actual cure," she muttered. "I don't want to lose any more patients." She looked over at Jack. He hadn't woken from the sedative. His vitals showed he was in the coma stage of the disease. She went and kissed him, hoping he could still feel it. She turned her back and walked away. When she got to her office, she closed the door and opened the com. "Captain?"

He answered immediately. "Did you find anything?"

"We . . . I hope so. I need some test subjects. With no symptoms."

"I'll find them."

A half-hour later, six crewmembers reported to her. She had to reject Anita, a tall blond woman she'd played poker with on long quiet evenings. Anita had a fever, and when Linda told Naidu to check her into the ward, Anita's face flashed betrayal and loss. Linda had to fight not to look away. "I'm sorry, Anita. Maybe we'll find something in time."

She felt like she was lying.

"You can't try the operation anyway, see if it helps?"

"It's spread by now, too far into your system." She held Anita's hand. "I've got to go. Please understand. If we can help you, we will, but we have to save enough crew to fly us home."

Anita squeezed Linda's hand and turned away. "I know," she said.

The other five were a good cross-section; two younger women and three men of varying ages. Linda only knew one of them well—Ed, who cooked up lunch every day. "Hey, people are going to get hungry for a day or so," she said.

Ed squeezed her hand. "I left some soup on," he said.

"Good. We're going to put you to sleep for a bit and maybe you'll be back making cookies in a few days."

Linda and Shanna strapped them all down and Belinda connected to the operating units and downloaded instructions to five sets of targeted nanobots. Each crewmember received sedatives before bots. Linda timed the sedatives for an hour. She left Belinda and Dragon in the operating ward and worked through sick rooms, sticking as close to Jack as she could, always moving.

The captain interrupted her via com. "How long until you know?"

"Statistically, at least one of them should develop symptoms in eight hours or so. If we fail." She swallowed. "That's the only bet we can make. If you have more volunteers, I'll take them in two hours."

"When the watch changes, I'll ask the crew going off."

He must be balancing crew assignments tightly. "Okay. Send them."

"Can I try it?"

"You have someone else to leave in charge?"

Silence. "You have him right now. I'll wait." He suddenly sounded immensely tired. "I'll call back in a few hours."

Two more crew members checked in, one so hot and wobbly Naidu had to carry her to a couch. They were out of beds. The patient's short dark hair was so damp it stuck to her head and to Naidu's arm, leaving streaks of sweat on his scrubs.

By that night, the five volunteers showed no symptoms and three more had undergone the procedure and were sleeping. Ed wanted to go back to the kitchen.

Linda rested on a chair by Jack's bed. She muttered and sang softly for a half-hour, unable to sleep, then stood and paced, and finally returned to the endless work. She bundled two more dead into the hallway, cleaned up gurneys, and piled sweat-stained sheets for laundering.

She kept looking at her watch. Time was moving so slowly she seemed to get a lot done; little things, necessary things. Finally, eight hours passed. No new symptoms among the people operated on. The captain must have been watching the time as well. He reached her before she called him.

"It's not a guarantee," she cautioned. "We haven't the time or resources to know if this is a real cure."

He didn't reply, but just started designing crew schedules to send as many people to medical as possible. He took back the five who were still healthy, opening the door between the ward and the ship for two-way traffic. "If this doesn't work, we're out of time anyway," he said.

It was Linda's turn not to answer.

"You go next," he said. "Have the surgery."

When she woke up, she felt groggy and tired. Shanna handed her a cup of coffee. "Now move," she said, "I need that bed."

Linda looked at Belinda and Dragon. "Jack?"

Shanna shook her head.

A deep weariness sank through Linda's body and she took half the coffee in one gulp, burning her mouth.

"The captain's coming next."

"Do you need me?"

"Not until that coffee hits you," Shanna touched Linda's arm gently and turned back to greet the next patient. "But leave the boxes. I need them if you're gone."

Linda nodded and went by Jack's room. The color had left his skin when the life drained from it, and he looked waxy and frail. "We did it," she whispered to him. "We'll make it to Jupiter because you were brave enough to risk your career."

She took his body to the airlock corridor herself, stacking it with the rest of them.

The captain ordered every healthy crew member to have the surgery. The operating pods ran all day until they were done. Losses stopped at half the crew.

Two days later, Linda took Jack's box with her when she went to turn the rest of the dead out into space. There had been no new cases; Anita was the last one to die. Linda sent Jack's body out of the airlock last and watched the emptiness as the lock cycled closed. She leaned against the corridor wall and cried. After a while, Linda realized the box was singing the song "Puff the Magic Dragon." Linda joined in and they finished the song together, standing in the cold corridor, singing to the empty airlock.

She stumbled into her room, suddenly exhausted in the absence of emergency. Dragon was quiet, as if sending Jack's body outside had sapped him as well. Belinda said he was all right, and that she'd stay hooked to the net in the operating ward. Linda set the box on her headboard. It was quiet, but the light blinked, indicating awareness, a steady flash of green across her closed eyelids. Even in the quiet, it felt like company. She dreamed of dragons and pirates and poetry mixed with diseases and dying.

The first day Linda made it out of the

medical ward, she stood on the bridge with the captain and watched Jupiter grow larger in the viewport. The captain spoke quietly. "I can protect you legally. I can't do the same for the uploads. They'll be destroyed when we get to Jupiter."

Linda swallowed. It felt like a part of her was going to die. "I was in the AI wars. I understand." She knew the law was firm. Her voice shook. "Jupiter Station will take us in, then?"

"They'll let us orbit while we do a full decon, including cargo, then they'll send specialists up to the ship. They'll look and wait to be sure they don't catch the disease; use your operating scheme to save them if they show signs. It's the best plan we've been able to think of."

Linda swallowed. "Then do me a favor?"

"I can't keep them . . . aware," he said gently.

"Can you call the epidemic 'Pirate'?"

"I don't understand."

"It tried to cripple our ship, right? Pirates do that kind of thing, and sometimes they get beaten back by dragons." Linda kept her eyes forward, on the viewscreen. They were close enough that she could see Jupiter's great red spot. ■

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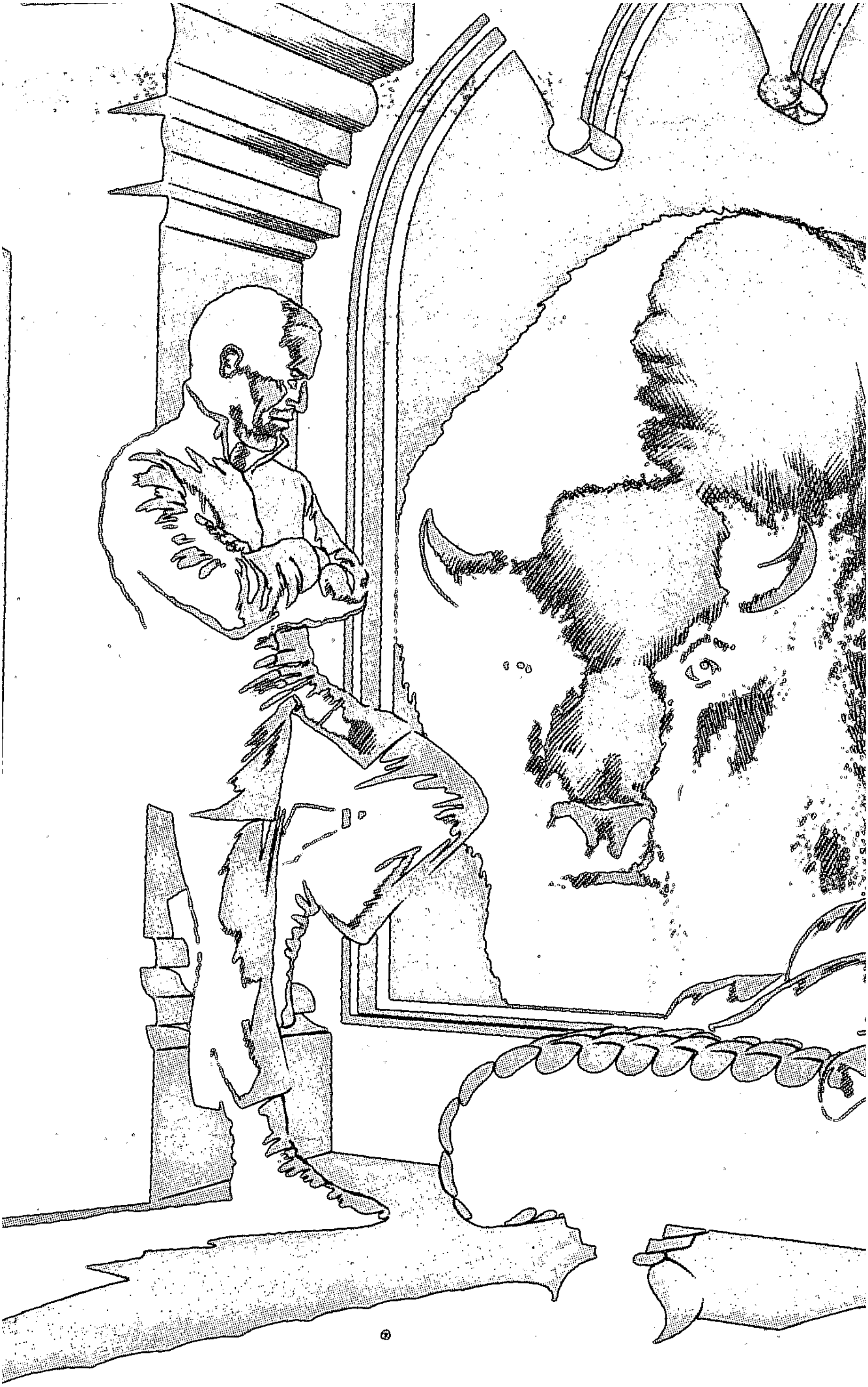
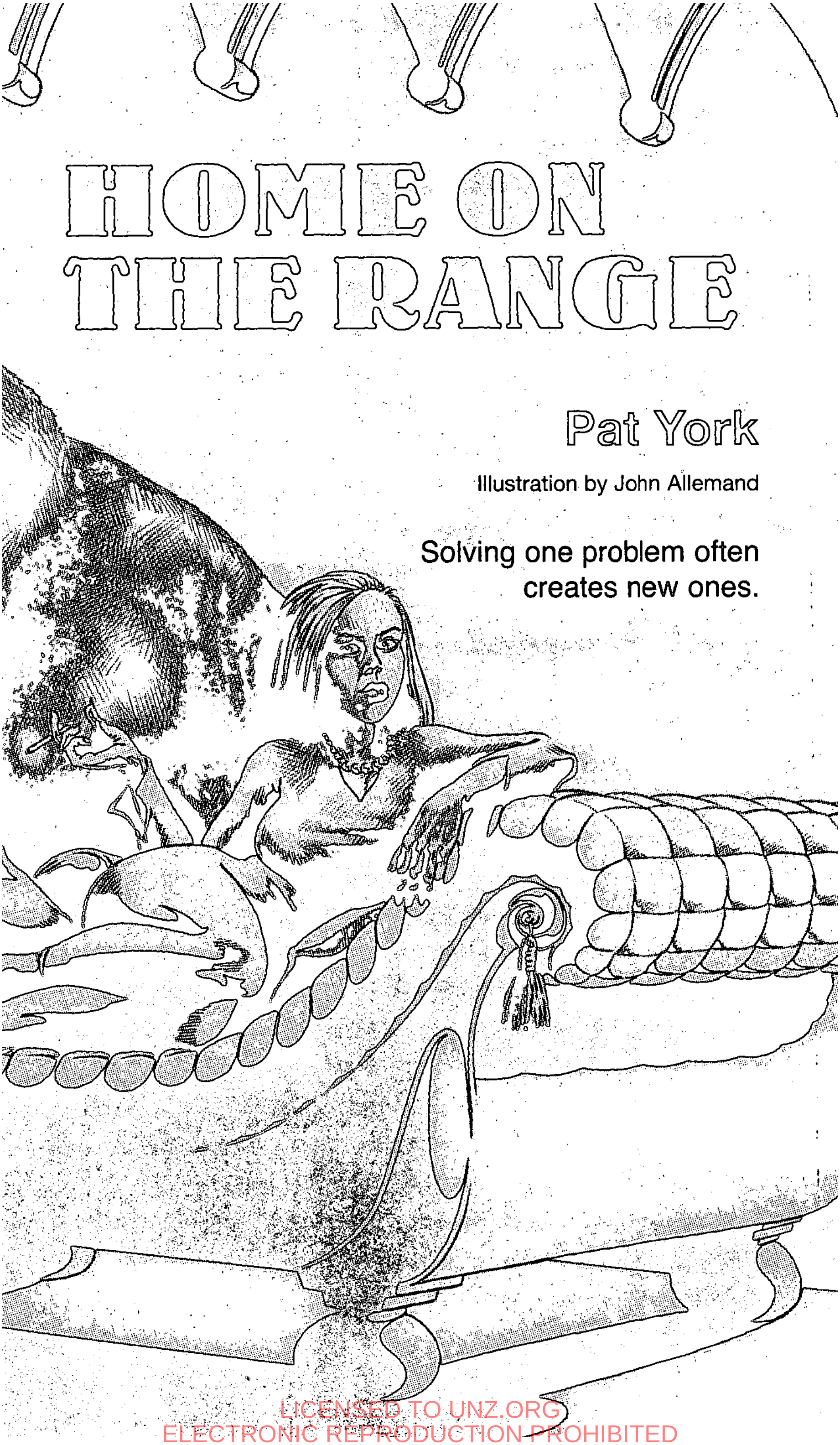


HOME ON THE RANGE

Pat York

Illustration by John Allemand

Solving one problem often creates new ones.



It was his dream house until the buffalo came.

They woke him early one morning when one of them thumped heavily up onto the steps of a gazebo that Luba liked to call a Georgian folly. Jake had ordered it placed on the small rise of land between the newly planted privet hedge and the lawn.

"Dad!" His ten-year-old son's sleepy voice pulled him out of bed. "You gotta see this, Dad!"

"What? Jake?" Luba's slim arm reached to him across the heavy linen sheets and the silk counterpane, her clipped middle European accent fuzzy with sleep. Her perfect nails were red on his skin. Jake felt a familiar tingle of desire but ignored it.

"What is it?"

"I don't know, sweetheart. Don't get up." Jack petted her smooth skin. She pulled the sheet up over her heavy, dark hair and turned over.

Jake strode down the broad, oak-paneled corridor into William's room. The nanny came in from her own room.

"Mr. Sowrda? What is it?"

"Look! Miercoles, check it out!" William pulled the young woman over to the window seat. He was just as tall as she was, Jake couldn't help noticing with pride.

Huddled together they could look across the broad vista of Jake's carefully laid-out English gardens. And they could see the buffalo.

There were perhaps fifteen of them, two or three great bulls and the rest cows and calves. One beast with a great hump and clots of fur draping from his belly yanked out a section of the peony bed. He chewed through the waxy green leaves, chartreuse drool trailing from his mouth.

"Damn," William said in awe.

"Don't swear," Miercoles said absently. "I didn't think the G.A.D. herd was any closer than the Nebraska border."

"What's Gad?" William asked.

"Great American Desert Federal set-aside," Miercoles replied. "Big areas of prairie land purchased from failed farmers. Now it's dedicated to wildlife preservation."

"And passive wind collectors," Jake added.

"Well, yes, that too. And some solar collection."

Jake thought he could detect a note of annoyance in Miercoles' voice. He couldn't help smiling a little. Kids these days—all environmental sensitivity, and no practicality. "Our land is right on the border of the G.A.D., son."

"Buffalo. Wow." William stared hard out the window. He sounded as if he'd stopped listening after the adults' first sentences.

Jake's stomach knotted and a cold hand laid itself on his spine. He glanced involuntarily back at his own bedroom, thinking of Luba. She would *not* be happy about this.

One of the cows was chewing on the edge of the low privet hedge that separated the gravel path from the lawns. There was a sensor analysis hub buried right under that section of hedge, connected to the mainframe in the basement. Luba despised visible tech, but she didn't like wilted hedges or bugs in her flowers so she'd agreed to the sensors. If the buffalo stepped on that hub, Jake realized he'd lose all access to moisture content analysis, half the weather input, and he couldn't remember what all else. He shuddered.

Finally he stood and cinched his robe around his trim middle.

"They're destroying everything."

"But what can you do, Dad?" William asked. "They're a lot bigger than you."

Jake looked at his son, his son's top-dollar, U.C.L.A.-trained nanny, and then at the garden that had cost him three years and endless money and care.

He said nothing, but bolted from the room, down the carved staircase, out the back door and onto the terrace. "Out!" He bellowed at the top of his lungs, "Get outta here, you fuckin' hairbags, get out!"

The buffalo did not notice him, or pretended they did not. One glanced toward the great u-shaped house with its chaste federal windows and pilasters, and turned back to chewing on the maple sapling at the edge of the rose bed. The buffalo in the privet hedge glanced up as well and shifted her weight. He thought he could hear the crunch of plastic and metal.

Jake strode in slippered feet across the terrace and into the stables that occupied the south wing of the house. He hopped on the massive lawnmower. He started it, felt the maglevs engage. He steered the mower out and revved it to top speed, heading toward the buffalo herd. It hummed so loudly Jake could feel his teeth rattle.

The buffalo calves dashed toward the open meadow behind the folly, the cows following more slowly. But the bulls stood their ground.

Jake slowed the mower, unsure of what to do next. One bull's heavy head pendulumed and he began to paw the ground as the tractor neared. He tangled a hoof in a buried sprinkler head and ripped it and a section of its hose up out of the turf.

Jake stared for a long moment and slowly turned the mower around, heading back to the stables. Simon, the groundskeeper, was standing at the door to his apartment over the stables, a woolen robe done up around his waist. He was not watching Jake, but looking beyond him to the wreckage of the garden. The buffalo cows and calves were already wandering back over the rise to graze on the philodendrons.

"Damn, Jake, there's buffalo in the garden." Simon's British midlands accent made the words twang.

"Those are the exact words William used."

"Luba isn't going to like this. Look at that shrubbery."

"I'm not too happy myself!" Jake said. He rubbed his forehead wearily. He could feel his hot face under his fingers. "I was just going to ask you what we should do."

"There aren't many buffalo in England," Simon said. "We have to fight the deer a bit, but they tend to stay in the open ground and leave us to our gardens. A bit of dog shit worked into the soil seems to scare them off. And if that fails, Cashmere Bouquet soap will get them going every time."

"Soap?"

"We hang pieces of it inside net bags here and there. They hate the smell."

Jake nodded. "These are just big deer. Do whatever you want, Simon. We beat the prairie dogs and the field mice and the bugs—we can beat these guys."

A few days taught Jake that buffalo are not big deer. Simon tried all of his deer repellents, but none worked except coyote urine, and that had to be applied in such concentrations that the smell was as hard on the people as it was on the bison.

"However did Americans live with these creatures when this was a frontier?" Luba occupied her usual place on the damask-covered chaise lounge in the living room. It was here, beautifully dressed and surrounded by linen pillows, that she gave brisk directions to the help, phoned world-wide to talk with her friends, and kept up with her email, all without seeming to have a phone or a computer at hand. Jake had designed some of her systems himself. He had them installed in a case made up to look like a mahogany lap desk. The room was more formal than Jake liked, but Luba was comfortable in it, so it was there they sat most often. She kept her magazines nearby - *Vogue*, *Town and Country*, *Paris Match*. That and a bit of needlework kept her amused for hours. Unfortunately, she also had a perfect view of the half-ruined garden and the buffalo.

"Well, there weren't many people at first, except Indians. Indians loved the buffalo. They ate them, used their hides for their shelters, the sinews and bones for tools, they even used dried buffalo manure for their fires. Later, when farmers like my grandpa worked this land, the buffalo had been all but exterminated so they really didn't get in the way."

"Your fortunate ancestors," Luba said. "And now the buggers are back."

Jake almost winced. "Well, yes, I suppose so."

Luba cast a poisonous glance out the windows. "Can't imagine why the settlers wanted to live here in the first place. Can't imagine why we do."

"I thought you loved this house," he said softly.

"Well, it didn't have great, bloody, furball monsters in the garden before, did it?" She put a cigarette between her full lips and lit it with a snap of her gold lighter. Silver smoke drifted from her downturned mouth and into the carefully disguised air scrubbers.

Jake was startled. This was more temper than Luba had shown when William threw up on her cashmere bathrobe.

"I'll take care of it," he said. His throat was tight and his gut clenched again, but he kept his voice calm. He was rather proud of that.

Jake hired a half-dozen local horsemen to drive the buffalo off using air horns, but the animals just lowered their heads, walked away from the noise, and wandered back when the riders were gone.

Jake called on the local agricultural extension service representative a few days later. He was named Stanton.

"Why my land?"

"Well, Mr. Sowrda, there are a number of—"

"Call me Jake. Please."

It had taken a surprising amount of time to get an appointment, and the young man who sat across from him now had a curious mixture of harried distraction and excitement at meeting Jake.

Stanton smiled almost shyly. "This is a first for me, Mr., uh, Jake. I'm quite a fan. I've used your Eidetic-Boy memory wetware since I was in high school. It got me through college, frankly. But I guess you're tired of hearing how wonderful your products are."

Jake wanted to snap at the man, tell him to stick to business, but instead he pasted on his best publicity smile. "We can't get too much of that kind of compliment, Mr. Stanton. SowrdaSource tries to respond to the consumer. We get more than our share of complaints, so a compliment every now and then is a treat."

Stanton smiled softly, obviously flattered, then snapped back into business mode. "The proliferation of the bison population on public lands made this inevitable. There was a similar explosive growth of deer population on the East Coast at the end of the twentieth century after decades in which their numbers were reduced by overhunting and the loss of habitat. They came back in great numbers, especially in areas of low-density housing development, not unlike your own area, Mr. Sowrda. To make matters worse, there was no extant population of predators so there was no check on the deer population except maybe for a few house pets or cars and trucks. Again, just like this area. Very cruel, really."

"So what did the people in those communities do?"

Stanton looked a bit uncomfortable. "Well, they used chemical repellents, just as you did. They had some success with high-frequency sonic repellents, but they were prohibitively expensive and could disrupt other animals, such as birds." He rubbed his lower lip. "Finally most of those homeowners affected planted garden material that the deer didn't like. And those who could afford them, built fences."

"Fences?"

"I'm afraid the fencing you'd need to keep buffalo out is pretty ugly. It has to be big and heavy. And it wouldn't hurt if you electrified it.

Put a steel fence around 500 acres? The whole point of all his work and care had been to create a greenspace like those of the great homes of England: pleasure grounds sloping away to a parkland, a forest in the distance, trees in leaf in summer, bare and brooding in winter, a small lake gracing the open space in between. The vision hadn't been an easy one to realize on this dry, flat land, but he'd accomplished it.

He loved to watch his wife ride off slowly and gracefully in the morning, slim and elegant on her hot blood gelding. Sedentary as she was most of the time, Luba enjoyed a morning canter.

Jake loved to see his son and the nanny riding merrily on the gravel paths in the dog cart, a frisky pony between the traces. He loved to walk the green, silent grounds, scaring up the occasional covey of quail, noting the growth of each tree, and measuring the width of each shrub. Noting the deer tracks, remembering where the fox's dens hid.

It had been his dream when he'd lived on the prairie as a kid, then when he'd built his business here. Anyone could move to Europe. He would become rich enough to bring Europe to the prairie.

"I thought buffalo were nearly extinct," he said finally. "I thought they were still a protected species. That was why the government bought up all those ruined farms—to provide habitat, right?"

The ag rep shook his head. "No, that's actually not why they did it. It was because the whole ecosystem was exhausted. No one could make a living off this land anymore. The soil was worn out. It was overfertilized and loaded with pesticide residues. When the fast food chains went organic, the markets for our grain and beef dried up. Weather changes caused the wind to pick up and rip the topsoil off. The water it took to irrigate what was left cost the farmers a fortune and destroyed the aquifer. The big agribusinesses in East and the Southeast survived, but the dryland farming out here was over.

"The G.A.D. set-aside was a godsend. Protecting the land was good on every level. The farmers were given a better price than they could have hoped for on the open market and the land is resting and recovering." Stanton paused then, and shrugged. "But there are always unintended consequences to these things, and I guess your beautiful grounds, uh . . ."

"All right, all right. Just tell me what I should do."

"Well, you could stop irrigating that land so lavishly. All that juicy grass and open water and shade is a pretty big temptation to a hot, hungry bison."

Jake felt a thrill of grim frustration. "No. I won't do that. I won't just give it up."

Jake saw sudden caution spring into Stanton's face. He'd alarmed the guy with his vehemence, something he tried never to do to the people under him. But Stanton took a breath, gathered himself and said, "The state ag extension service hasn't had many prior complaints about bison, and certainly none of this magnitude. We haven't developed many solutions. Frankly, we don't have the resources to do much research. Maybe you could talk to the folks at the State Ag College?"

"I will," Jake said. "And I'll call Washington too. And my lawyers." He didn't bother trying to seem pleasant now. "But I'll tell you right now, I will do what it takes to get those goddam beasts off my land."

Jake kept an eye on the toilet readouts. His blood pressure was up, Luba's hormones were off, the servants were nervous, even William was showing stress. The readings weren't off enough to trigger an alert to their doctors, but they were not what they should have been.

One night Simon, Miercoles, Mel Stanton, and Jake sat on the terrace with some beers, watching the buffalo in the moonlight. Luba didn't come out. She didn't approve of being so familiar with "the staff," and she claimed the buffalo smell made her sick. Instead she was on her chaise, chatting laconically to one of her friends in London. Her voice drifted out to them, her accent furring the words in a way that always touched Jake's heart. ". . . prehistoric monstrosities . . . back of behind. The stench! . . . dying, sweetie, just dying out here . . ."

Behind them the Georgian façade of the house cast a shadow, cooling the warm air. The deep musk of the grazing buffalo came to them in the evening breeze.

"Well!" Miercoles pointed happily. "Rose's calf is eating grass!"

Jake had tagged the buffalo with microchips fired into their tough hides by air rifles. It helped him keep track of their movements. William had used the chip I.D.s to name the things. They were no longer "those buffalo." Now they were Studs, Rose, Nifty, Jim and the rest. Jake watched his son on the rise of land, shouting encouragement to Nasty and Buck as they ate a small clump of rose of Sharon bushes.

"We could try a sonic repellent," Simon said.

"On five hundred acres?" Miercoles said incredulously.

"Hell, if it can be watered with underground drips and pop-up sprinklers, it can be wired for sonic repellents," Jake said.

"Oh," Mel said, "I forgot to tell you, I called vendors about that just today. There is no known frequency that repels buffalo. Deer, rats, cats, you name it, they have a frequency, but not buffalo. Too big, maybe."

Miercoles was sitting near Mel. Jake noticed her watching the ag agent with a look he'd never seen on her face before. He smiled to himself, his mood lightening for just a moment.

"What's so bad about a fence?" Miercoles asked. "It probably won't show from the house."

"No fence," Jake said firmly. "What about a moat like the ones that they use in zoos? I've seen deep enough ditches hold in giraffes."

"Sure," Simon shrugged, "if you don't mind cutting the land off to every other living creature except the birds. And making it impossible to ride the horses off the property without a drawbridge. With a fence the rest of the wildlife can get under and the deer and elk can jump over, or we can make a narrow opening for them. Only the bison would be stopped."

Miercoles sipped her beer. "You could always move to London, or buy a country place in Scotland or somewhere. Luba would love that."

Jake gritted his teeth. "My ancestors homesteaded this land. This is where I was born. I started my business in my parents' barn right where we're sitting. Leaving is not an option."

The next day Jake called the landscape architect who'd helped him lay out the grounds of his house. She sent him some URLs. The fences were all ugly.

Practicality dictated heavy steel wire mesh held in place by deeply sunken steel posts. Luba wouldn't consider it. Jake agreed with her. There were split rail fences that some of his neighbors had around their own pastures. A "hot" electric wire was attached to the side of the fence to keep the animals from leaning on it and pushing it down as they tried to reach the juicy, irrigated grass on his property. He hated the folksiness of those fences as much as the industrial practicality of the steel.

It was hard to rouse Luba out of her daily languor to choose, but they finally settled on a tidy board fence like those used on horse farms in the east. It was a fence, but it didn't look too bad, and it could accept the electric wire, just as the others did.

An army of people invaded his property with laser surveying equipment, robotic augers and fence-makers.

Luba packed up Jake and Miercoles and took the SowrdaSource bouncer to London, promising to come back when the fence was done.

Jake re-hired the riders to drive the herd off his land before the fence was completed. Then he fenced the beasts out and turned on the current to a hot wire projecting from the wood.

Watching the massive hindquarters of the bison meander out into the dry prairie was one of the most satisfying sights of his life.

Mel Stanton came over that evening after work to look the fence over.

"I like it." He said and gazed down the long, white line of fence at the roadside.

Jake didn't like it at all, but he saw no point in grousing. Instead he gave himself the treat of calling the landscape architect and ordering new shrubs.

Twenty-five buffalo pushed a section of fence over about two weeks later and turned Jake's small lake into a wallow. The original fifteen and ten more. Jake's I.D. chips had proved that, at least.

"Mel, you said a fence would solve the problem." Jake was trying hard to make his voice sound reasonable but inside he was furious. Yet he and the ag rep had become friends. They stood in the folly, its roof sheltering them from the noon sun. There were flat, viscous patties of buffalo shit here and there. One step was broken, but the folly's decking was still intact if you didn't count the abrasions made by scraping hooves. He was more worried about the pillars that held up the roof. The buffalo were using them to scratch. One was off its foundation and the others looked rickety.

"Hell, Jake, I feel as bad as you do—"

"I really doubt that," Jake snapped.

Mel sighed and went on, "But I told you that we don't have much experience with this. If it's any comfort to you, I have reports of similar problems in the outer-ring suburbs in Boise. Small groups of males—no problem compared to this, but then they're not growing lush grass on the edge of the G.A.D. . . ."

"How could they get through the charged fence?"

Mel Stanton shrugged. "I guess they *really, really wanted that grass*. And they seem to be so very partial to your bedding plants. I did some more reading. It seems that in Kenya they've tried to keep elephants out of farmland using high-powered electric fencing. The elephants push a low-status female into the fence. She takes the charge until the circuit overloads, then they all cooperate to push the fence down."

Jake built a fantasy in which he hit Mel and watched him fall down the steps. He shook his head to clear the silly notion. After all, it wasn't Mel's fault. "And I can't build a piece of aversion wetware to make them sick when they come on the land?"

"Like I said before, the old legislation is very antagonistic to mixing high tech and wildlife management. They just didn't anticipate situations like this. You can lobby to have the laws changed, but until they are we're stuck with the old ways. We just have to figure out which old ways will work. Did Simon try the hot pepper on the grass?"

Jake nodded ruefully. "They loved it. They ate the treated grass down to the roots."

Jake left Mel to chat with Miercoles. She and William had come home as soon as the fence was done, but Luba had lingered on the continent. Jake strode into his study. He made some calls and gave some instructions.

It didn't take long, no more than a few days. He hired eight large cattle trucks and re-hired the cowboys. He was giving them a prosperous summer.

He had to bring in half a dozen loads of gravel to make a parking pad for the trucks, but one by one the riders filled each truck with buffalo and Jake watched with profound pleasure as they pulled out, on their way to Montana.

"Bloody hell!" was all Luba said when she finally came home a few days later.

Jake couldn't blame her. She had several friends in tow and the grounds were a gravel-covered, dung spattered, smelly, chewed up mess.

Her eurotrash buddies stayed two weeks, making silly demands on the staff, staying up all hours and boring Jake to tears. He spent a lot of time working.

The day after they left, fifteen buffalo, some tagged and some not, pushed down the mended fence and made their stately way onto Jake's freshly seeded lawns.

"What about poison?"

Mel looked uncomfortable. "They're still technically a protected species, but they're doing a lot of damage and you can certainly prove you've tried to mitigate their impact. Maybe I could get the permit, but, shit, Jake, you have your boy and your employees' kids running all over the place and the horses and there's deer and rabbit and fox in those woods and . . ."

"Okay, okay," Jake sighed. Mel Stanton and Miercoles were dating now, and from the sound of this speech, she'd already prepped Mel on what to say when the subject of poisons came up.

"Then let's shoot them," he said.

Mel looked startled. "Well, I don't actually hunt, Jake. Do you?"

Jake shook his head. "I've spent most of my life in front of a computer—never had much time for outdoor stuff until just recently. That's why this place meant so much to me. Part of why."

"There's plenty of hunters around here, but they go for quail, pheasant and such. You'd need a mortar round to bring down a buffalo."

Jake glanced over to be sure that Mel was joking. "Seriously, who'd know where to find some careful, experienced hunters?"

Mel shrugged. "One of the guys from the gun club in town, maybe?"

"Will you start the paperwork to get me permission? I'll have my lawyers call you."

Mel looked very unhappy, but he nodded.

It turned out to be simple. There were a number of sport shooters within five miles of Jake's town with guns capable of doing the job.

Jake and Simon tracked down Jim Cullen, a local pharmacist, and took him out to coffee to discuss it. Jim was the president of the sportsman's club and knew all the most skilled hunters.

"Modern ammo couldn't be better for this kind of job. There's an embedded chip that directs a tiny directional rocket. It sends the projectile straight for the animal's brain, where it explodes. No pain involved."

Jake nodded. "I'd like it to be as easy on the animals as possible," he said.

"I've seen your wonderful home since the buffalo came. Took my family to see. Funny thing: the buffalo haven't bothered anyone else's yards—they head straight for yours. I suppose because it's so big and so green and there's water. It's a crying shame what they've done. But on another level this sort of a hunt is a most unpleasant thing. It would be a sort of historic re-enactment," Jim said. "European buffalo hunts destroyed Indians and that made the prairie safe for what Europeans called settlement."

"Europeans?" Simon snapped, deliberately thickening his Lancashire accent.

"Hey, no offence, friend," Jim Cullen said quickly. "Water over the dam. But I'm Ogalala on my mom's side, so this history stuff is important to me. White soldiers and buffalo hunters, they killed buffalo by the millions and never collected more than hides or tongues from most of them. It wasn't an official policy, just encouraged by the army and the government. The migratory tribes of the plains couldn't have been stopped for decades if their source of food had held out. But the great buffalo hunt took care of that."

Simon looked down into his tea and said nothing more. Jim cringed a bit and studied his coke.

"The point is," Jake said, "that was two hundred years ago and right now there are lots of buffalo and they're costing me a fortune, and destroying the work of years." He almost added, "and driving my wife away," but thought better of it. "Jim, you think you can scare up some people to help me get rid of just a few in a good cause?"

"Sure, sure I do." Jim glanced at Simon, regret clearly showing on his face. "It could be a club project, I guess. Although I must tell you, I did some research after I got your call. Buffalo make lousy hunting. When you shoot the first one, the others huddle around it, so it's no trouble picking them off one by one. It's usually not like you see in old westerns, with a thundering, stampeding herd running away from you. The guys who actually did the hunting in the old days wrote in their diaries that hunting buffalo was no fun at all. Now mind, if a buffalo realizes he's being attacked, he'll fight back as brave as any animal you can name, but they don't exactly understand guns."

"Okay." Jake rose and shook Jim's hand. "I really appreciate this. We'll call as soon as we get the permits."

"Yep, and I'll contact a couple of the club members. I should be able to find three or four folks who are interested. No point in letting the animals suffer. Quick and clean kill, that's the hunter's creed." Jim turned to Simon and proffered a hand, "And no hard feelings about that crack about Europeans, okay? I have some really fine friends who are Europeans."

Simon put out a hand and shook Jim's, and Jim gave a big smile and a friendly hand to the shoulder. Jake couldn't help noticing that Simon didn't look at Jim as he did it.

Jake stood and shook the pharmacist's hand. "We'll be in touch." Feeling a little queasy but satisfied, he got up and left.

He called the Tribal Councils of several Indian bands whose members telecommuted, writing code for SowrdaSource. They were thrilled at the idea of getting fresh buffalo meat, hide and horns.

"We've never stopped teaching traditional crafts, of course. It's our heritage and it gives the kids and teachers a bit of extra income. Most of our saleable craft goods are made from beef products," one Elder said. "This is a real windfall for us. Thanks!"

Jake reserved freezer trucks and hired meat packers from four or five towns to dress out the carcasses. He set up a tent near the lake to keep the process sanitary and asked U.S.D.A. meat inspectors to come and approve the meat. It soothed him to think that he would be rid of the pests and the native bands would have an impressive new source of money-making materials. He decided to throw in some computing equipment and wetware to each band's schools. Some of his best coders lived on rezzes. It couldn't hurt to recruit them young before Microsoft got to them.

"So you're really going to shoot them?" Simon said to him one morning.

"I don't like it any better than you do, Simon, but it's them or my grounds. The two are incompatible. And I did not work all this time, struggle to make this vision for myself and my family, just to see it destroyed by hoofed rats. Anyway, you're from England—a completely tamed country. You can't know what this is like."

Simon stood silent for a moment then said, "Jake, I need a couple of days off. Do you think you and Luba can do without me?" Nothing showed on the man's face as he said it.

Jake was startled and a little hurt. "Well, yes, sure, I guess. Where are you going?"

Simon looked uncomfortable then and Jake was suddenly sorry he had asked. "Take all the time you need. Do you want transport? The company ship can bounce you wherever you need to go."

Simon flushed red. "No, no, but thanks. That's very generous."

"I take care of valuable employees," Jake said softly. Without answering, Simon turned and walked away.

Luba surprised him more than Simon had. "Kill them? You're going to kill them?"

"What else can I do, honey? I've tried everything else."

Her voice was troubled and perhaps something else. "What about all that history you were discussing? Your Indians and all that? For Godsake, Jake, you needn't kill them."

"Then get used to them destroying your home, because I've tried everything else. Absolutely everything."

She pushed a thick strand of dark hair behind her ear and sat silent for a long time. He was more startled by this deep silence than by anything she could have said.

Finally she sighed and said, "William and I'd better take off, then. This is no place for us for a few days."

Jake realized only at that moment how right she was. "Yes, God, yes. Definitely take a trip."

She looked up through her lashes, giving him an appraising glance. "Well, William shouldn't be here, but I suppose I should stay. After all," she paused, her color deepening under her make-up, "you wouldn't be doing this if I hadn't gone starkers on you."

"It will be much easier if you're all gone. It's bound to be grisly," Jake said as decisively as he could. She had been draped across her chaise, but she rose then, in one smooth motion, to kneel down beside his chair. "Let them have the bloody grounds, Jake. I don't care all that much, truly. It's not worth all this. We'll stop watering and let the prairie take over. It'll be a bit desolate compared to what it was, but we'll get used to it."

From the day he'd met her, Jake knew that Luba was a more sophisticated person than he was. He had wooed he away from London and her own smal business and her friends largely becaus of what she was. Not, as most of thei friends thought, because of what sh looked like. Now, looking down at he upturned face, he almost hesitated Maybe she was right. This might actuall be a very bad idea.

Suddenly, he thought he saw something very risky behind her gaze. He'd almost missed it, but at the last secon he'd caught that glance-behind-he glance. His breath caught at the nea miss. He pulled her up onto his lap an held her. "I made this decision and it' right. I've made up my mind, you hav nothing to worry about. They're just animals, love, like a cow or a sheep They'll die in the wild eventually anyway. Here they'll die without much pai and they'll provide food for good people. There's no point getting sentimental."

There was a tiny play of muscle around her perfect eyes. She didn't argue with him, but rose and walked t the door. "I'd better start getting organized. There's no one here to help m pack."

Jake saw them all off the next morning. Luba had made reservations in D.C. and said something about showing William the museums. Jake suspected that Miercoles would be doing most o the actual showing, but he was content.

"Uh, see you," Miercoles said afte Jake had hugged his wife. She wouldn't meet his eye.

Jake hugged his boy. "Dad, we have to kill Rose and her calf, don't we?"

"Not if you don't want me to." He looked over his son's shoulder at Miercoles. She stared back looking guilty and defiant by turns. "But I explained to you that they won't suffer and that if we don't do something they'll keep destroying the grounds."

William's shoulders slumped. "I guess they'd be lonely anyway, all alone with everybody else gone."

"And we will use every part, just like in the old days, like you read in your history book. Just as we discussed."

"Okay, Dad. Okay." William let go and they were gone.

Jake felt like an assassin as he watched his son waving at him loyally under the dome of the limo, until his sad face receded into the dusk.

The next morning the pleasant and easygoing ladies and gentlemen of the Rod and Gun Club were gathered on the terrace, gazing admiringly at his beautiful home. The meat cutters were waiting as well, surrounding the coffee urn, comparing blades and chatting about the weather.

Mel Stanton had the government permits in his pocket. There was a permit to discharge a weapon within 100 yards of a house, another permitting them to kill a protected species and yet another permitting the transfer of materials taken from a controlled animal. It had taken a lot of work to get them. "Well, we're wasting daylight," Jim Cullen said heartily to the other three shooters. They nodded and unpacked their weapons, each cradled in a leather case with handles and carrying straps. On the outside of the gun cases were bulging pockets. Jake imagined they were full of cartridges.

He led the way to the folly at the top of the small rise. There were one or two buffalo nearby, but the main herd was down by the lake. The meat cutters followed, to have a look themselves.

Jake and the hunters stood on the small rise of land, looking down at the beasts as they stood by the lake, drinking and browsing on the grass. Sticking out of the ground here and there were sprinkler heads, the trunks of saplings, and in one spot, a sundial, tipped on its side and half submerged in muck.

"My goodness," one of the women said, "look at your poor garden. They've destroyed it."

"Yes," Jake said. "You'd never know it had ever been an English garden."

"Maybe," she said, "but even now it sure doesn't look like the prairie, does it?"

Jake looked about him. "No, I guess not."

Jim began to unsheathe his gun. It was big—bigger than Jake could have imagined. He went over it carefully, loaded it, checked it again and said, "I'm ready."

"Me too," the woman said.

"I'm good," another man said.

"I'm ready," the smallest woman added, beginning to walk down toward the animals.

The oldest of the meat cutters turned to the tents. "C'mon, boys," he said, "there goes the pack to the hunt. We'd better get ready."

Jake froze in his tracks. The hunters turned to look at him. "What did you say?" He stared at the butcher.

"Mr. Sowrda?"

"Call me Jake. What did you say?"

The man glanced around and blushed deeply. "I just said we'd better get ready."

"No, the other thing."

The man paused, looking lost, then his eyes flew open, "Oh! I just said that the hunters were getting started, is all. I said, 'There goes the pack.'"

Mel and Miercoles came back from their honeymoon just as the last of the snow was melting. Jake could still remember the taste of their amazing wedding supper. Luba had been great, actually warm and gracious, but she'd always been a bit partial to Miercoles. They took Jake's offer of a cottage just beyond the stables in a small grove of newly planted trees. Any other plan would have meant looking for a new nanny and Luba just wasn't up to that.

Jake took Mel for a walk while William, Luba and Miercoles took a tour of the newlyweds' new home.

They heard the first of the howls just as they reached the edge of the lake.

Two others joined it and soon a wolf serenade filled the chilly twilight air.

"So they know when we're coming," Mel said. "That's amazing."

"It's all in the collars . . . and the training. No invasive electronics. I think you'll like Mr. Stibbits, but don't expect to see much of him. He really likes his wolves a lot more than people."

Jake was feeling expansive. He was glad Mel and Miercoles were back and he wanted to brag about his wolf pack. "It was just the way I figured it. That meat cutter got me to stop thinking like a man and start thinking like a buffalo. Once I started asking the right questions, the right answers were right there in front of me. We never even thought about predators. Never occurred to us because everybody knows that wild wolf packs are extinct in this part of the world, except for a few isolated pockets in the national parks and maybe one or two packs introduced way up in Wyoming. Only it turns out wolves aren't extinct—not everywhere. I found this pack in a refuge in Saskatchewan and sure enough, they'd been raised on buffalo meat, because it was handy and free. Mr. Stibbits was pretty reluctant about the collars at first. He kept talking about natural systems and trust issues and such. Seems they love him and they can be made to love any people they trust. You know, this guy crawls right into the den to count the new pups. And they let him! They think of him as one of the family."

Mel shook his head, grinning, "And you call him 'Mr.'. Never thought I'd hear that!"

"Wait until you meet him. He's Mr. Stibbits and I'm Mr. Sowrda." Jake chuckled and went on, "Anyway, I knew Luba wouldn't be satisfied without being completely sure that we were safe," Jake paused. He knew who she was most worried about, but what did that matter now? "So I told him about Luba and he seemed to understand. In fact, he was more enthusiastic than I was. That was just about the time you two went off to Spain."

"I can't believe I finally found time for a real vacation," Mel laughed, "but a honeymoon will get you sympathy that no other excuse will. Three years back vacation time. And you know what? The ag world did not fall apart! So these wolves keep their distance from humans, but how do they know where you are?"

Jake held up a handsome, slim watch. "We have a G.P.S. system built into our watches. The same system that monitors the garden systems has been set up to triangulate the wolves and us. We get too close to each other, the wolves hear an unpleasant tone. They move off. They're really pretty shy. They don't need that much encouragement. And I've used the system to monitor their health. Fleas, parasites, illnesses, that kind of stuff."

"And the buffalo have kept their distance?"

"Completely. They don't come near the fence. The wolf pack can move past the fence into G.A.D. territory easily, so they hunt the herd well out into the open country. They get an old animal or a calf pretty regularly, but when they don't, we provide supplemental buffalo meat. The gun club takes care of that for me."

Mel glanced nervously at Jake, "The wolves actually kill buffalo? That couldn't be a very pleasant thing to see."

"We don't see it," Jake said. "They hunt at night as often as during the day, and since they stay away from us, their kills happen out of sight of the house. If anyone has seen anything, they haven't told me."

"And the government knows you have them."

Jake nodded. "As we've already seen, our government would do quite a bit to keep a multi-billion-dollar enterprise in this state."

"And your neighbors are still talking to you."

"Well, they're not actually that close, are they? And I put out a big public announcement about what I was doing, including a bond that would pay three times the cost of any animal the wolves touched. Ham Sprocket claimed it for a dog. He was lying, but I paid up. Since then, nobody has had a complaint."

Mel shrugged. "They knew if you gave up the fight that their properties were next. Maybe they don't water like you do, but they put out feed and keep watering troughs."

"Hmph. I hadn't thought of that."

"You were so secretive," Mel said, "while you were setting it all up that I was beginning to wonder about you."

Jake was silent for a moment, his buoyant mood gone. "I just couldn't stand to have another big, public disappointment, Mel. You remember when I sent everybody home the day of the big hunt. Well, I just didn't want to tell anybody anything until I was sure it would work. You'll remember I even asked Luba not to come back for a little while."

Mel nodded. Jake glanced over at him as they rounded the last bend in the walk around the lake. There were plenty of signs that the buffalo had been there, but they would fade when the growing season started again. Simon and his crew had used what they could of the winter to do repairs on the garden's infrastructure. Only spring could allow the growing things to repair themselves.

He tried to imagine this land as it was when he was a boy. It had been beautiful then, but not as it was now. By midsummer it would be well on its way to its English beauty once again. Luba would be so happy.

"I really hope you and Miercoles will be as happy as Luba and I are," he finally said.

There was another long pause, "Well, I hope I can be half as good a husband as you are."

Jake was honestly flattered. "Thanks, Mel. I try. God knows, I try." ■

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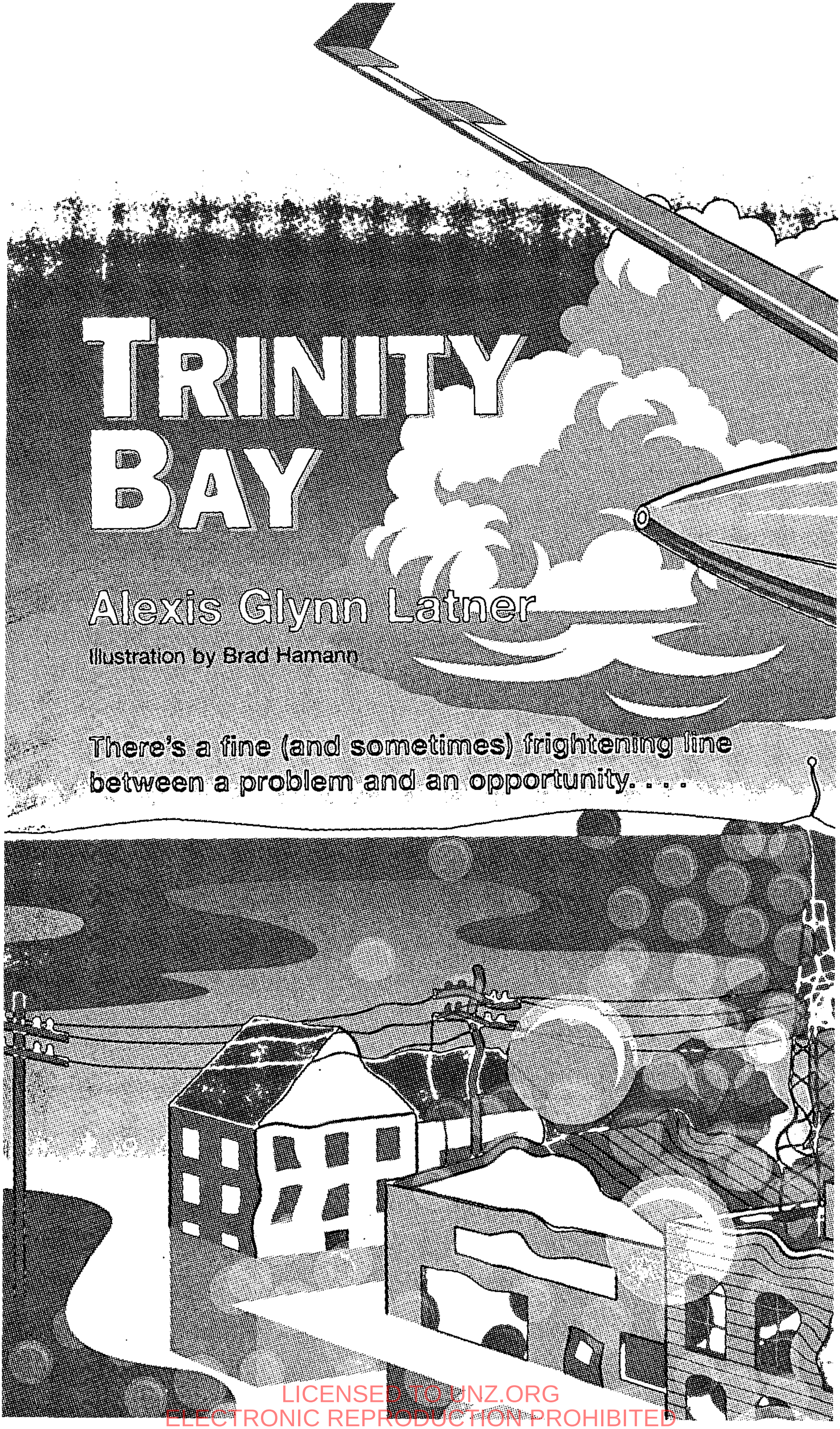
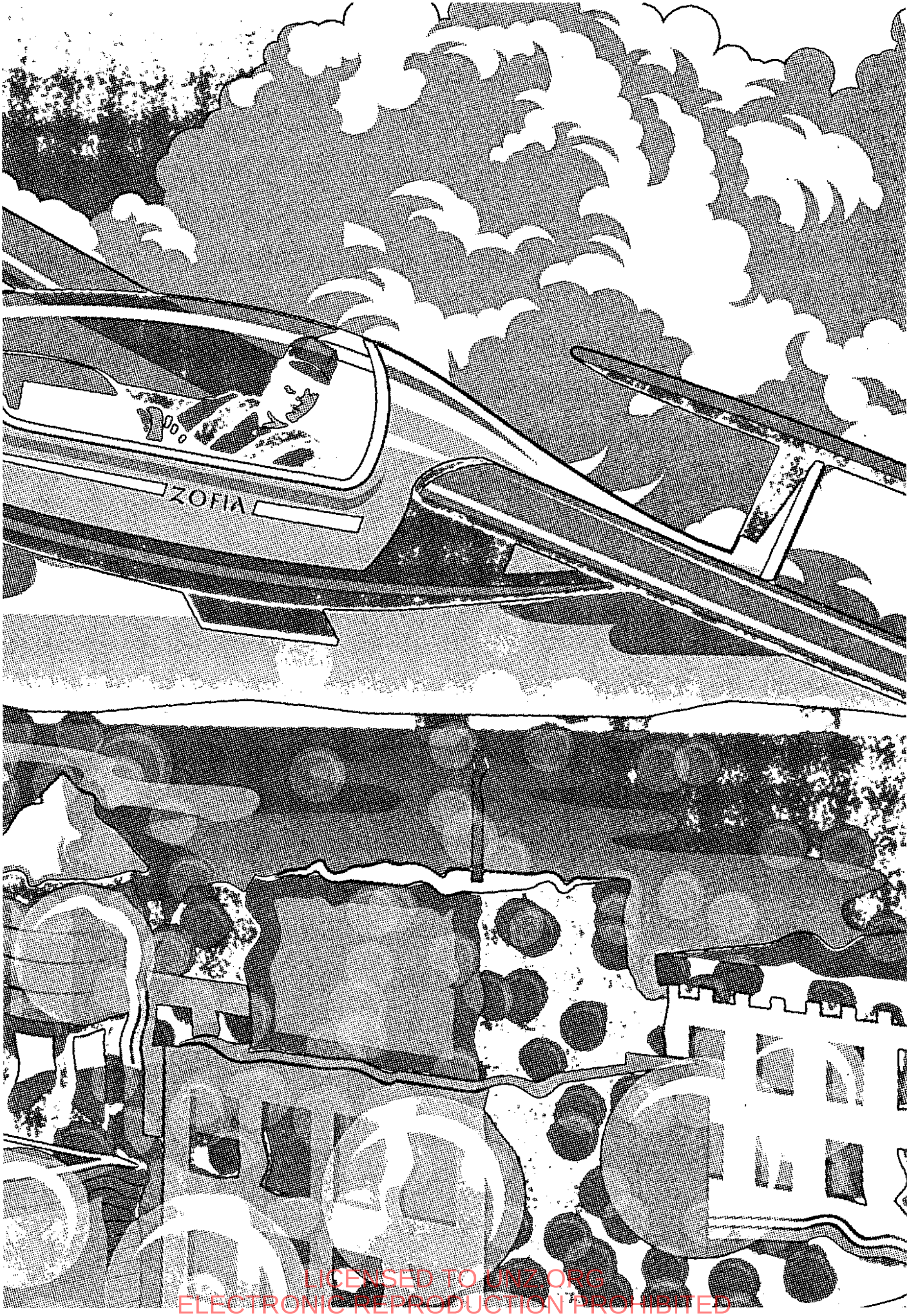


TRINITY BAY

Alexis Glynn Latner

Illustration by Brad Hamann

There's a fine (and sometimes) frightening line between a problem and an opportunity. . . .


ZOFIA

circled tightly, and the warm rising air carried him skyward. The sailplane's long, thin carbonglass wings flexed as it soared like a huge white hawk. He felt at one with the sailplane—finally, after a steep learning curve in which the Zofia had seemed too fast and sleek for him to handle—finally, Evan Gage felt at home at the Zofia's controls. His wings embraced the sky.

He'd almost forgotten the other sailplane pilots; the radio startled him. "Seven Zulu, Victor Twenty-Three, Pretty Quick, where are you guys?" The reedy voice belonged to Adam Sorrentino. Sortie flew an old racing sailplane, 22T, that fit his veteran skills like a suede glove.

"Pretty Quick is over Navasota," Beth Torres answered from PQ. No call came in from Trent Young in Victor Twenty-Three. Trent, otherwise known as the Silent Racer, was practicing for a national contest and couldn't be bothered with small radio talk.

"Seven Zulu is near New Waverly," Evan radioed. "I'm working east today."

"'East' is a four-letter word!" Sortie cackled.

"I'm in lift at 5,000 feet," Evan pointed out.

"Go ahead, be a nonconformist. The rest of us are heading west. Cloud bases are near 7,000 on the other side of Brenham. Two to Tango, out and away."

Radio reception was crystal clear. The Zofia had avionics as sophisticated as its aerodynamics, with everything wired into the flight computer. It seemed less like a sailplane with a collection of instruments than a single entity with intelligence inversely proportional to its vocabulary. The audible variometer chirped brightly. *Up-up-up-up* . . . The vario sounded like a contralto cricket.

Lifted by the solar-heated air rising off a plowed field, Evan spiraled up to the

The Sam Houston National Forest spread out below the Zofia like a ragged, woolly rug. In the old days, thermals over the national forest were weak and unreliable this early in the year and it would have been smarter to fly westward, over fields and pastures and toasty asphalt. But this May was as hot and clear as the Junes of Evan's youth. Greenhouse Texas was a good place for sailplanes. To be able to fly a sky like this, in a sailplane like the Zofia—state of the art, and wondrous art it was—made Evan glad to be living now, though he wondered what kind of world his grandchildren, ages five and three, were scampering toward.

In the distance, the green rug of trees gleamed where a large amount of water had been spilled on it. Torrential rains in North Texas were flooding down the Trinity River—a vast, turbid slug of water crawling toward the Gulf of Mexico. Evan marveled at the flood, and the translucency of the Zofia's canopy, as he worked his way toward bloated Lake Livingston.

A few circles in the thermals (*up-up-up!*) under widely scattered cumulus clouds regained the slight altitude lost between them. Thermals were sun-warmed air rising, crowned by clouds: solar energy kept him in the sky, Evan reflected. Of course, aviation gasoline put him in the sky in the first place. About an hour ago, the sturdy tow plane had pulled the Zofia up to 2,000 feet. Then Evan had pulled the release and gone on his way while the tow plane spiraled back down for the next customer. But avgas was solar energy too, packed in plant matter and stored in the Earth for eons as oil. Then pumped up and piped to refineries, politicked and fought over, for a century and a half since that black gold first gushed out of a hole in the ground in Pennsylvania.

Now the world's energy options were fractured. Oil coexisted with other alternatives, in a technological and political flux that sorted careers, companies and nations into the quick and the dead. Evan's own company, which specialized in energy project initiation, belonged to the former category: the quick. He'd been successful because he kept the company small, sharp-edged, and flexible, like a dagger.

On a summer Sunday, though, he enjoyed the simplicity of riding solar-heated air. He danced amid the cogs of the world's greatest engine, the atmosphere.

Evan's attention snapped fully back to flying when he noticed the watery glint around the trees below him. In stable air the Zofia could easily glide miles forward for a single mile of altitude lost. Evan wouldn't find much lift in the sodden landscape adjacent to the flood. But thanks to the Zofia's performance he could do plenty of sightseeing before turning back to dry ground. With altitude to spare, Evan angled across the foot of Lake Livingston toward the dam.

The Lake Livingston dam was a spectacle. Full to the brim and then some, the lake overflowed the dam in a huge white fantail of water. The parking lot beside the dam, partially inundated, contained dozens of toy cars parked in rows, and clumps of animated dots by the water's edge—sightseers. Evan circled, taking in the scene from his lofty front-row seat.

Up . . . Up . . .

Up?

With a few control inputs, Evan centered the glider in the lift and turned tight circles. *Up, up, up* the Zofia chirped approvingly, high above the roiling water at the dam's foot, where no self-respecting thermal ought to exist.

Sometimes there was no accounting for the vagaries of the air. Moreover, the superbly designed Zofia could ride the most tenuous of thermals. She could practically gain altitude on the hot air of a campaign speech. With a mental shrug, Evan accepted the serendipitous altitude.

At 5,000 feet high in the blue—no cloud overhead—he turned the sailplane out over the swollen Trinity River. *Dow-wn, dow-wn.* The sink tone was a drunken cricket with a slurred chirp. Sink was what Evan expected here, relatively cool air settling Earthward. What goes up must come back down, even if it's air. He found it weirdly reassuring to hear the vario confirm that. Assuming moderate sink everywhere above the floodwaters, he had thirty miles of leeway before he got uncomfortably low.

Evan noted drowned fields stippled with the topmost parts of crops, and cattle huddled on islands that were hills in dryer times. It all looked deceptively peaceful, considering it was a watery purgatory, anticipated and awful nonetheless, to the people who lived there. All but a few stubborn holdouts had been evacuated. He was a lucky man to sail above those troubles in a new Zofia.

Up, the Zofia suggested. *Up.*

Puzzled, Evan automatically pulled the Zofia into a circle.

Up, up!

Evan was shocked. He shouldn't get lift over water. It violated a rule bored into the bones of sailplane pilots: *Get too low over a body of water and you'll have to swim the rest of the way back to solid ground!* Yet six miles downstream from the dam, out in the middle of the flood, the Zofia balanced on a bubble of warm air like an ant on a cork. The sailplane gained altitude, chirping contentedly.

The Silent Racer had a tale about a soaring competition in France in which he got lift from a nuclear reactor's cooling pond. But reactor ponds were a *very* special case.

"How's it going, Seven Zulu?" radioed

Sortie.

"I'm above the Trinity flood."

"That's right, rub it in. That hot new ship of yours can glide from there to Kingdom Come."

"Hey guys, I'm in four-knot lift going through 8,000 feet." Beth Torres sounded happy.

"Turning Giddens for Cameron," said the Silent Racer on the radio, to point out that he intended go further, faster than anybody else, as usual.

The Zofia's altimeter read 4,700 feet. Almost one mile high over a drowned landscape and climbing. Beyond doubt, Evan had found a hot spot in the flood, or at any rate a warm spot: it might not have to be more than 20 degrees warmer than the surrounding water to kick off a thermal. Evan had never heard of a warm spot in a lake. Maybe he was over some drowned hamlet—Romayor, perhaps—not cold-soaked by immersion yet?

But Evan had won his own contests in life by making it a habit to think outside of convenient boxes. Pursing his lips, he mentally reviewed what lay upstream along the Trinity River. An unremarkable expanse of central Texas terrain. A handful of common-garden-variety towns now bailing water. And Dallas. Ground zero of the great flood of '20.

"Hey Ev?" Sortie on the radio again. "You anywhere near Liberty?"

"Uh—" Evan distractedly checked the flight computer's graphical map. Very little on the map resembled the ground at present, with myriads of distinguishing features being under water. "Well north. Why?"

"My wife just radioed up from the ground and said there's some kinda disaster in progress at Liberty, on top of the flood. The darn reporters can't agree on whether it's had a major pollution spill or the town's on fire. You see anything?"

Evan scanned the sky. "No, no smoke plume or—" His voice caught in his throat as pattern recognition kicked in. *Cloud street.* A line of evenly spaced cumulus clouds swerved southeastward, clouds with fluffy white tops and flat gray bottoms, like a path of cottony paving stones in the sky. The cloud street followed the main channel of the Trinity River, but ran east of it. It was as though the clouds had developed directly over the river and were offset by the wind, which was from the west.

A cloud street should not exist perpendicular to the wind direction. Normal cloud streets formed parallel to the wind!

Warm spots laced the flood, kicking off thermals that rose invisibly to cumulate in the innocuous-looking clouds. The telltale line of clouds pointed south, like an omen written on the sky by the finger of fate.

"Say again, Seven Zulu?" Sortie prompted.

"I've got enough altitude to fly to Liberty," said Evan.

"Ev, be careful!" That was Beth's voice.

"I will, I promise." The paving-stone-gray undersides of the clouds in the street told Evan that there was probably lift under them. If not, the Zofia could easily glide to dry land. The prospect of being safe in a danger zone exhilarated Evan. So did mentally prying at the situation, trying to read the meaning written on the sky in clouds.

In the beginning was Silicon Valley. Then Silicon Prairie—the high tech environs of Austin. After the turn of the twenty-first century, Nanotech Prairie evolved around Houston with its ambitious research universities. Last, around Dallas and along the Trinity River, came what some pundits called Nanoplasm Paradise.

What if something washed into the Trinity River from the labs in Paradise? A half dozen military-industrial and corporate labs existed inside multiple veils of national security and proprietary secrecy. If a nanoplasm escaped into the Trinity flood and multiplied wildly, what would happen? Evan didn't know. The eco-system rights advocates who conducted protests in Nanoplasm Paradise didn't know either. If government and corporate scientists knew, they didn't publicly say. But the predicted signature of runaway nanotechnology—either robotic or cyborganic, replicating out of control—was *heat.*

Evan leaned forward and repositioned the bright red marker-bug on the rim of the altimeter, so the bug pointed at 3,000. If he couldn't stay above that altitude, he would immediately point the sailplane's nose toward safe ground, he resolved, no matter how exciting it might be to investigate the Liberty disaster. He glanced at the GPS map on the flight computer, verifying that Liberty County had several airports in range. He only had to select one and the computer would instantly give him the direction and distance to it.

If runaway colonies of nanoplasm were multiplying in the Trinity River in puddles of heat, they were destroying organic molecules, reassembling carbon and other atoms into replicas of themselves. Evan was more titillated by the prospect of runaway nanotechnology than convinced of it. Still, he had no intention of ditching in the flood, a man made of protoplasm in a carbonglass glider, to run even an unlikely risk of being remade into microscopic monsters.

Still circling in the improbable thermal he'd found in the middle of the flood, wanting to gain as much altitude as possible, Evan glanced up through the crystal-clear canopy to see a shining white wisp above him. He had already entered the strange cloud street! A cloud was only now condensing atop this thermal.

Finding himself already in the unnatural cloud street made it easy to squelch the alarmed little voice of caution in the back of his mind. He pointed the Zofia's nose toward Liberty.

Oh Hell, Evan thought, oh Hell! Liberty, Texas, was melting, and it was melting UP.

Liberty should have been a collection of nondescript buildings with floodwater around their knees. But the structures sagged, amid pale bubbles and spikes that had nothing to do with the architecture of houses and gas stations. A strange sheen surrounded the city in the floodwater, a glassy, purple-gray cast, like a bacterial colony gifted with rich food—on a scale that boggled the mind.

Up. Up. Circling 3,900 feet high, under a cloud in the street, Evan believed he was safe, though his heart raced from apprehension. Everything he had read and heard about nanoplasms concurred that the tiny cyborgs were too heavy to be carried into the atmosphere as aerosols and too fragile to survive outside of an aqueous environment.

Below his altitude, a couple of power aircraft quartered back and forth over the stricken town. The authorities, Evan guessed. That they flew at a lower altitude than his, not staying upwind, reassured him. Nothing on Earth could have convinced Evan to touch the glassy water around Liberty, though. He gaped at the ruined town, suffocated in spikes and bubbles of pale stuff taller than the roofs and trees. Holy Mother of God, what *was* the stuff?

Nobody had yet invented nanoscale robotic assemblers that could run away in the wild. Assembler technology required just the right atoms available to assemble, thus an exactingly designed feedstock. Nanoplasm was more potentially ecophagous—as the Life's Rights protesters pointed out.

Liberty was melting—up!—and yet the roofs of farmhouses and barns out in the country looked unaffected. The forest appeared perfectly normal. Flooded corn and soybeans still looked like the top parts of corn and soybeans. What did Liberty have that the forest and fields lacked? Azaleas? Brick? Gas stations. . . ? Evan now recalled that Liberty had a gasoline storage facility, serried ranks of tanks, brim full of solar energy in the form of liquid petroleum. Partial comprehension dawned on him and he cursed out loud.

Evan belatedly noticed more airplanes. Five shared the sky over Liberty with him. Startled, he reached toward the flight computer to turn on collision-avoidance color. But his hand froze while his mind raced.

The airplanes were all light twins, with two engines each, for insurance: if one conked out it was possible to limp away from the flood with the remaining engine. Stodgy, turn-of-the-century lines and bland paint jobs suggested government issue. Evan guessed that the airplanes carried officials and scientists trying to make sense of what had happened to Liberty. If they saw him, he'd be herded away immediately and might have questions to answer later.

Instead of collision-avoidance paint, Evan told the flight computer to camouflage the Zofia's skin.

Race competitors sometimes opted for camouflage so nobody could follow them to the choicest thermals. Flying a sailplane for simple recreation, Evan normally wanted to be visible. Now, though, a cloud-dappled blue sheen spread over the wings and fuselage. He could discern the long wing edges, but from a distance the Zofia would melt into the sky.

That programmable paint was spectacularly effective. He had damn well better watch out for those airplanes. He was invisible as water vapor to them.

A flashy, non-government-issue-looking aircraft caught his full attention by passing within 1,000 feet of where he circled. His finger darted toward the function key that would have turned the Zofia international orange even as he realized that collision was not imminent. He read the bold N-number on the other aircraft's tail: NRGY3. Then he recognized the teal-silver-red paint job. "Well, well, look who's here," said Evan.

The flashy twin, which continued a long sweep around Liberty, was a corporate plane belonging to N-ergy of Dallas.

N-ergy: Nanotechnology for the Energy Industry. The company had billion-dollar dealings, but compared to oil, gas, wind, sun, and fuel cells, the nanoscale novelties that N-ergy wheeled and dealed with struck most people in the industry as being too damn close to imaginary. It didn't help the trust factor that N-ergy was secretive, allowing almost no external review.

Evan's reflexes tingled. By seeing Liberty, he had placed himself in a risky situation. But in his life—admittedly he'd led a charmed life so far—risk always came with potential reward. Always. He knew enough now, and it was time to go.

East and west, the Trinity flood spread far and wide. The river's ominous cloud street, though, which had given him plenty of lift all the way to Liberty, continued south, toward the sea And far off in the distance, onshore winds had created a sea breeze front with clouds that looked like whipped cream spattered in a line across the horizon between sea and sky.

Evan felt an electric jolt of anticipation as a plan condensed in his mind He'd had nearly six decades of a good even charmed life; his children wer grown and competent parents of thei own children. Flying south meant bot predictable and incalculable danger But in the Zofia, Evan had a tool and companion beyond the dreams of th generations of men before him.

Something huge and dangerou stalked toward the Gulf of Mexico, wit puffs of cloud to mark its invisible bu crushing footfalls. And Evan tracked th invisible monster like a hunter on wing of wind.

It felt profoundly unnatural to fly sailplane toward the sea, and his nerve chorused tension.

The cloud street dwindled. Its gra bottomed cumulus clouds became wid ly spaced cottonpuffs without any cool cloud shadow. Thirsty, he downed the contents of his water bottle and regretted not bringing a second bottle. His backside ached to announce that it wanted out of the form-fitting seat.

In the green countryside northwest of Houston, his fellow club members would be landing at the gliderport, hangaring sailplanes, relaxing on the deck of the clubhouse to regale each other with tales of the day's soaring, popping cold sodas and beers. Only the Silent Racer would stay up much longer—conditioning himself for long contest days. Meanwhile, Evan Gage ran toward the Gulf of Mexico, with fraying mental concentration and no spare water, in a weakening cloud street.

He felt like a quixotic fool, but he pressed on.

North of Trinity Bay, the cloud street petered out completely. Had he outrun the monster?

Had he imagined it? Irritated with himself, Evan shook his head to shake out that weak and indecisive doubt.

Did salt water stop the nanoplasm? Maybe. But Trinity Bay wasn't saline anymore, given the vast amount of fresh water dumped into it by the flood.

The Zofia drifted down through 3,000 feet above sea level, chirping dully. With the help of the flight computer, Evan calculated the best speed to fly. Even a Zofia sank fast if she flew much below *or* above the right speed for the conditions. If he miscalculated, he'd have to ditch in Trinity Bay, with the invisible monster stalking ***him***. Evan gritted his teeth and double-checked the best speed to fly.

Evan had an excruciating excess of time in which to observe Trinity Bay expand as he inexorably lost altitude. Subtly textured, like damask fabric, the water looked dun-colored, only shading to blue beyond the haze of distance. The Bay's most striking feature was a big oil platform. Several helicopters hovered near the platform like bees around a rosebush.

Finally, the sea breeze front stretched across the sky above Evan, a tangled belt of crisp white clouds. "Okay, lady. We climb or else!"

Air masses collided at the front—cooler sea air meeting a warmer, continental air mass—creating the belt of clouds and, on the inland edge of the clouds, strong lift that booted the Zofia up bodily. *UP-UP-UP!* The empty water bottle skidded out of his lap. He stuffed it back in the storage webbing one-handed.

At cloudbase, Evan deeply breathed the cool air flowing in through the vent. His fingers cramped from holding the control stick too tightly, so he flexed his hand as he surveyed his vastly improved options.

Chambers County lay to the east, its airport too close to Trinity Bay for comfort. Westward beyond the water, Baytown bristled with the silver architecture of refineries. He would shun refineries today! Better to go as far toward undiluted salt water as he could fly and still land on dry ground.

He could glide to deserted, undeveloped Bolivar Island from here. Or, by following the sea breeze front south and west, he could position himself to jump to Galveston Island—on the rim of the salty Gulf and inside the pale of civilization.

Evan looked back to the north. The monster hadn't reached Trinity Bay. Yet.

He dug the cell phone out of his shirt pocket and speed-dialed a number.

"Hello!" Leo Redwine, the Vice President for Advanced Technologies of Oceaneering International, sounded tense, as well he might.

"Leo, this is Evan Gage. Are they evacuating Painted Horse?"

Leo cursed. "We got word that the flood is bringing toxic pollution into the bay. So yes, they're abandoning the platform—helicopters shuttling workers ashore. Our techs are in the next load up to go, and they've got all of the software. I hope. God knows if we'll be able to decontaminate our equipment and how far back this'll set the project!"

"Listen, Leo. Keep your telops working. Transfer control to shore. Keep the telemetry up—the environmental monitoring, the SEANTS, in-situ analysis, everything. You're going to want to know what happens to Painted Horse."

Birds chirped behind Leo's silence. The Trinity Bay crisis had evidently caught him at his weekly game of golf. "Okay." Leo hung up.

Evan felt grim satisfaction. It said something about his influence in the energy industry that the Oceaneering VP would act on his cryptic advice.

The cogs of the Earth's atmospheric engine gently meshed along the sea breeze front, and the Zofia was a carbonglass butterfly skittering through the meshing winds. Evan stayed in the lift on the inland edge of the front, flying south and west.

In a gray cloudbase haze at 2,000 feet—clouds near the coast formed less than half as high up as clouds further inland—Evan calculated a final glide to Galveston Island. He triple-checked the results, as the profuse sweat on his body chilled in the cloud-base coolness.

He hesitated.

The Zofia was a dangerously hot glider for a tired pilot. He'd been making beginner's mistakes, pushing too hard on the rudder pedals for his control stick movements, uncoordinated, as though the nerveways between his hands and feet were clogged with the metabolic debris of fatigue. And he still had to land somewhere. And the Zofia's long, supple wings made landing anywhere except on a runway tricky.

Trent Young could have handled this situation. Old Sortie, who'd flown 22T so long that the sailplane was his second skin, would have managed a safe landout in 22T in Evan's place. Beth Torres flew a trusty little glider that could land on a postage-stamp of a field if necessary. And Beth was young and resilient. "Evan, you may be too old for this to be a lark," he admitted to himself.

But the sea breeze front was moving north. He could delay, and have no choice but to to land on Smith Point in a ragged cow pasture, or he could set out across Galveston bay *now.*

Once and for all, he flicked the control stick toward the ocean-blue southern horizon.

Under the seaward edge of the frontal clouds, heavy sink threatened to plunge the Zofia into the bay. Evan instantly aimed the nose down and she arrowed through the sink, going downward fast, but forward, out of the plummeting cooled air, even faster.

They didn't make sea breeze fronts like they used to, Evan thought in sharp dismay. The front's sink was stronger than any he remembered from his younger days. It had robbed him of irreplaceable altitude. The air behind the sea breeze front was stable and devoid of lift.

Holding the Zofia's nose steady, aiming for the ribbonlike barrier island in the distance, Evan discovered the cell phone still clutched in his left hand. So he called his wife.

"Evan!" she exclaimed. "I got a cal from the gliderport! Mr. Sorrentino was worried that you might have landed ou in—"

"No, I'm in *Nigdzie,*" Evan interrupted. They'd adopted that code word—Polish for "nowhere"—almost two decades ago. Evan had been in Saud Arabia when the oil fields became killing fields and American specialists escaped through the byways of the Middle East with not everybody making it out alive *Nigdzie* meant somewhere better lef unnamed when unfriendly ears migh overhear.

"Oh, no!" Malgorzata said. "Evan, b careful!"

"Always, Maggie. Always. *Ja ci kocham,*" he added, *I love you,* in he native Polish.

The Zophia might kill him.

He wouldn't be the first middle-aged sailplane pilot to die when his performance curve dropped below that of his glider near the end of a flight. That would be viciously ironic and unfair to Maggie. Her father had designed the Zofia, the old aeronautical engineer's crowning achievement in sailplane design.

Do-wn, do-wn, do-wn, the vario repeated, like a dismal metronome. Evan swallowed around a dry throat. He was dehydrated. And low. He'd reach Galveston Island with few options left. The first time Evan had landed a single-place sailplane, faster and more sensitive than anything he'd ever flown and without a back seat for the instructor to rehearse landing with him before he did it on his own, a thunderstorm developed near the gliderport while he played in the sky; when it came time to land and it dawned on him that he had unpredictable wind to contend with, he'd been scared spitless. Like now.

The last card up his sleeve was the Zofia's almost magically high lift-over-drag ratio. Sixty to one, and not just with the leading edges clean of bugs and every other parameter impossibly perfect too. Her glide ratio was a reliable, stake-your-life-on-it, sixty to one. *60:1, 60:1.* His brain recited the ratio like an incantation.

Evan scanned the east end of Galveston Island, looking for enough unobstructed real estate to put the Zofia down on. Soggy salt marsh fringed the bayward side of the island. The roads all had light poles hemming the asphalt in. The beach on the far side of the island looked landable, but sand dunes flanked the beach. If he didn't clear the dunes, and one of the Zofia's wings struck, she'd cartwheel, and he would be a dead man.

He crossed the water's edge low enough to see the cordgrass heaving on the bay's foamy wavelets.

Up, the Zophia whispered.

The sandy, hot dunes were generating weak lift. Evan seized it. Circling, he inched upward with the intense patience of a man extricating himself from disaster.

A great dark bird slanted toward him. For a few moments it soared with him, cocking its head, as if puzzled at the huge cloud-blue fellow bird. It had long slender wings, sculpted by evolution to ride the air just above the swells of the ocean, skimming the sea.

Evan only had a few glimpses of the frigatebird before it veered away, but that was enough. The bird left him with hope.

With a slight cushion of altitude, Evan set off along Galveston Island. It had been a hot day on the island. Wisps of lift from the dunes, and hot air percolating off the wide asphalt length of Sea Wall Boulevard, were just enough to keep the Zofia aloft. The Zofia skimmed westward less than 800 feet above the heads of oblivious tourists.

By circling above the sun-baked parking lot of a Wal-Mart, Evan gained 150 feet of altitude—a jackpot reward under the tight circumstances.

Evan's cell phone chimed. To his surprise, it wasn't a worried Maggie. It was Leo Redwine. "Okay, Ev, I got the ball rolling. Now you tell me—what's going to happen to Painted Horse?"

"Can't explain now," Evan said. "Just get your best people in position to follow the telemetry from the SEANTS."

Evan's brain sparkled with inspiration, possibly a final surge of neurotransmitters before fatigue shut his neurons down. "Contact Zhenyang Chen at the Center for Biological and Environmental Nanotechnology at Rice University. He goes by Zeno. Get Zeno Chen into the loop."

"What the hell do I say to this guy?"

"Tell him I said this is the opportunity of a lifetime for him." Evan remembered attending the Tenth Nano-Vivo Summit at Rice where Chen had opened his eyes to the possibilities of biological nanotechnology. Evan subsequently sought

Chen out. They talked at length. He knew what Zeno and Zeno's field could do. "Leo, this is the opportunity of a lifetime for us too," Evan added. "Meet me at my office first thing tomorrow morning."

"I'll do that," said Leo.

Through a sea haze, Evan discerned the glass pyramids of Moody Gardens, which let him locate the criss-cross concrete lines of Galveston's airport. Overjoyed, he radioed, "Scholes Tower, this is glider Four Seven Seven Zulu, three miles east."

"Scholes?" the Silent Racer radioed back. "Gage, are you near *Scholes Field!?"*

"Sorry, I'm on the wrong frequency!" Evan hastily changed frequencies and repeated the call.

"Aircraft calling Scholes, say your type again?" replied the control tower.

"I'm a glider descending through 500 feet. I'll land straight in on the closed runway near Flights and Sights."

"Okay," said the tower controller, who couldn't very well order a low and engineless glider to fly a regulation landing pattern. "Cleared to land runway one six. Be advised of heavy helicopter traffic in the area."

They were evacuating oil platforms in the Gulf, Evan guessed. As well they might. Evan veered toward the back side of the Island rather than venture between the busy helicopter base and the sea. Moments later, he was glad he'd changed course: a burly chopper churned by off his left wingtip, oblivious to him.

Gradually losing altitude over blocks of tract houses adjacent to Scholes Field, Evan smelled barbecue smoke. He crossed the airport perimeter and lined up with the closed runway with his heart racing. He pulled the airbrake handle. Twin red panels rotated up out of the wings, and the Zofia dove to Earth like an angel on company business.

Argk! Argk! blared the gear-up warning. Evan yanked the landing-gear lever just in time to lower the main wheel and touch down with a tire-rubber bounce rather than a shriek of shredding carbonglass. He rolled along the concrete, jolting on grassy cracks, and came a stop under the FLIGHTS AND SIGHTS sign. Last of all the Zofia's unsupported left wing delicately tipped onto the pavement.

"We did it, lady," Evan sighed, with his head in his hands. "We did it."

Evan opened the canopy and climbec out with effort. Dizzy with relief, stifi and sore, he felt more like seventy-nine years old than fifty-nine. He staggerec into the bungalow that housed Flight and Sights.

Inside the air-conditioned main room a small excited crowd clustered arounc a flatwall television showing a map o the lower Texas coast. Ominous re lines outlined the extent of the Trinit flood. The red-lined zone included th refineries of Baytown.

Evan went to the restroom. H washed his face. He drank six cups o water while the newscast showed incredulous newscasters and flummoxe local officials. A strained University o Houston researcher tried to say something accurate but not definitive abou runaway nanotechnology. It was clea that the authorities weren't explainin much, but the news media were bus adding two and two.

Conspicuously absent was footage c Liberty's meltup. Evan knew he hadn been seeing things when he gaped a that transmogrified town. The talk a Flights and Sights was of the gasolin storage facility near Liberty catching fir But no one had seen images of the fi on TV. Evan suspected a news blackou the meltup of Liberty being kept secr while N-ergy and the government trie to make sense of it behind the red cu tain of the restricted zone.

The President of the United State was reported to be en route to Housto together with the Energy Secretary.

Evan felt better now—not a day ov

sixty-nine. He left the air-conditioned bungalow to go back outdoors into the warm sea air. The setting sun blazed in a sky-wide pool of light, a glorious greenhouse-world sunset.

The Zofia rested with her left wing down, the slim right wing angled up into the sky, and her cloud camouflage still on. Blue and cloud-silver shadows ghosted across her skin. Two line boys, whose job it was to promptly secure visiting airplanes, hovered, fascinated and unsure what do to with the Zofia.

Evan pulled the Zofia off the runway himself and tied the wings securely to the ground while he explained programmable aircraft paint to the line boys. Meanwhile he mentally kicked himself. Dehydrated and distracted, he'd forgotten about the camoflage. Lucky the Zofia hadn't been turned into glass confetti by colliding with that helicopter!

Finally Evan opened the canopy to turn off the master electrical switch. Then he remembered the startled radio call from the Silent Racer: *Scholes?!*

He'd flown from the gliderport to Lake Livingston to Scholes Field. According to the flight computer, which had dutifully kept track and only needed to be asked to produce the number, he flew 206 miles today, the longest soaring flight of his life. More than 100 miles of it had been above water and below 5,000 feet of altitude. That probably qualified him for a record in the annals of the Soaring Society of America, provided, of course, that life for the SSA and the world would ever be normal again. While he flew, the world under his ship's cloudy wings had tilted on its axis and gone spinning toward an unexpected future.

Evan had adult children younger than the cushions he borrowed from Flights and Sights' ancient couch. But it beat resting on bare asphalt. He lined the cushions up in the Zofia's dark shadow under a glaring security light and stretched out on the cushions. Stars twinkled in the humid sky. The steady sea breeze kept mosquitoes—and perhaps other, invisible, unnatural bugs—at bay.

In the thrill of the chase, it had been easy to believe that nanoplasms were too fragile and too heavy to spread in aerosol form. In retrospect, it was easy to doubt. When Evan dozed off, he dreamed about plastic twisting in his lungs and woke up with an unpleasant catch in his side.

The sound of an approaching vehicle and headlights splashing the Zophia brought Evan to his feet. The car stopped with the muffled rattle of a safety chain, and behind it the Zofia's own long white trailer gleamed in the night.

Beth Torres hopped out of the car. "I went by Rice University, like you wanted, and got these people. And their equipment."

Three young males emerged from the car. Two were Zeno Chen's graduate students, the third a post-doctoral researcher whose name was Jeremy. Soon they were helping Evan take the Zofia apart. All three wore thick plastic gloves.

"The wing is secured by a very snug pin," Evan explained. "Jiggle it—raise the wing tip there—"

"Ugmff!" said the grad student at the wing base, when the wing backed off the pin and he took its weight. "This thing's heavy!"

"Which edges are important?" Jeremy asked.

"The front edges catch bugs in flight." Evan pointed out the leading edges of the wings.

His helpers inexpertly but successfully manhandled both wings into the trailer, upright in the wing cradles. Then all three Rice researchers disappeared into the trailer with the wings. Clinking and whirring noises came out of the trailer along with quiet, purposeful voices.

Beth had watched the proceedings. She looked at Evan with large dark eyes. "Nice of them to clean your leading edges for you."

"They're cleaning the leading edges like they've never been cleaned before," said Evan.

"I'm glad you have a connection like this. The government doesn't know what to do."

"These guys do." Evan put a reassuring, and well-washed, hand on the young woman's shoulder.

The grad students emerged from the trailer; Jeremy gestured, and Evan took their place in the trailer. He crouched between the wings as Jeremy ran a small vacuum cleaning device over his clothes. In the darkness, Evan could make out a label on the vacuum cleaner. It said CBEN CHEN LAB.

"Should I worry?" Evan asked Jeremy in a voice barely audible over the vacuum cleaner.

The post-doc shook his head. "If one of these things was alive when it landed on your mucous membranes, your immune system would dismantle it immediately. Just shower when you get home. You won't shed anything alive into the sewer system—except your usual microbes." Jeremy methodically vacuumed Evan's hair, which stood up under the nozzle. His scalp tingled. "The worst real danger is to the world energy infrastructure."

Evan's shoulder rested against the Zofia's wing. Evan put his hand on the leading edge to stroke the slick carbonglass. His fingers found no grit, no sticky dead insects, no holes where a nanoplasm had attacked his sailplane. "So the issue is containment."

"Containment is the great big burning issue," Jeremy agreed. "Whatever we find on the cleaning cloths and filters, it's going to be powerful evidence. Zeno said you had some kind of graphical track too?" Jeremy snapped the vacuum cleaner off.

Evan handed him the datadisk from the Zofia's flight computer. "The loops in the track are where the water was warm. The densest looping was Liberty."

"What did it look like?" Jeremy askec in a murmur.

"Like nothing I've ever seen," Evan answered. "Like a plastic riot."

Evan stood at his office window which he'd switched to transparen mode for the twenty-seventh floor view Sunrise light bathed the shiny flanks o neighboring skyscrapers. Gazing east Evan half expected to see a distant glassy eruption, which would mean tha the nanoplasm had reached the refineries beside Galveston Bay, and it was th end of his world.

"Your visitors are here," said David his sleek and competent administrativ assistant.

Evan turned to greet them. After yesterday's marathon flight, he felt horribl tired. But he could hide physical an emotional wear and tear. The gabardin armor of a dark business suit helpe greatly.

Well aware that the visitors were ke players in the energy industry, Davi served coffee with practiced nonintru siveness.

"Everybody else in downtown Hou ton is gaping at the news," said Ann Co han, "or making contingency plans i case the city has to be evacuated in spit of the reassurances of the President. S why are we meeting with you?"

Evan answered, "N-ergy made the li tle bug that caused this big trouble."

Ann gave him a sharp, gray-eyed lool "How do you know?"

"I have a friend in a high place." He picture hung on the wall near his desl his Zofia when she was brand new ou side the factory in Poland. David, stan ing behind the visitors, got the joke an flashed a grin. "N-ergy created nanoplasm that metabolizes oil. It's g ing to transform our business."

Ann Cohan was a major oil compar executive. Every strand of her silver ha reflected a critical decision in a roug unforgiving business. "I don't need yo to tell me the game's over if a plague destroys oil," she said sourly.

"It doesn't! David, please go gape at the news for us. Interrupt if there are any new developments. Ann, the nanoplasm doesn't so much destroy oil as it transforms petroleum into other stuff. Stuff that may be useful."

"Just how do you know?"

Evan gestured toward his other visitor. "This is Leo Redwine of Oceaneering, International. Oceaneering had an experimental research project operating from the Painted Horse platform in Trinity Bay."

Leo looked rumpled from lack of sleep, but ecstatic. "Deep sea ANTS. We deployed the first swarm at Painted Horse, in shallow water, to test them, just last week."

"ANTS means Autonomous Nanotechnology Swarm," Evan told Ann. "Small mobile robots designed for space missions, or in this case undersea missions—SEANTS. Each unit has sensing or analyzing instruments. They operate far away from human controllers, to intelligently explore the unexpected."

Leo cracked a grin. "It turns out the SEANTS are even better than the designers proposed when they were sober. We got a good picture of the whole nanoplasm event. We think we even sampled the nanoplasm itself. In-situ analysis results have been coming in since midnight."

The three of them pored over the results that Leo showed on his laptop. Ann looked faintly stunned as she viewed pictures of the superstructure of Painted Horse. The platform's framework sagged amid pale, iridescent shapes that looked like giant soap bubbles, carelessly pitched cellophane tents, and huge pinwheels made out of plastic wrap.

Leo scrolled through a set of sketchy diagrams on his laptop screen. "That guy from Rice—Chen—is a ball of fire. Brilliant scientist. He took data coming back from the SEANTS and figured out what was happening. The nanoplasm converts crude oil by a kind of catalytic processing. It's like metabolic activity and like chemical plant processing. The result is a complicated set of polymers that link into macrocopic structures."

"The petroleum reservoir is turning into useless plastic?" Ann threw up her hands. Her company had a large stake in the shallow water oil field in the region.

David briefly reappeared to report, "Petroleum pipelines are being shut down all around Galveston Bay! That's to stop the nanoplasm from spreading through the pipelines!"

"If it's out of control, it doesn't matter how useful it might be," Ann grated.

"Containment is the great big burning question," Evan agreed. His wristwatch read 9:03. He activated the Webwall with a virtual address at Rice University. The wallpaper—David had cleverly selected an Oriental pattern of clouds and cranes for today—shimmered and faded to reveal Zeno Chen in his own office, sitting behind his desk with an expectant air. They had agreed to touch base at 9 A.M. After introducing Chen to Ann Cohen, Evan said, "We were just speaking about containment. What can you tell us?"

"Salt is a hostile environment for the nanoplasm," Chen said. "It won't survive farther into the Gulf than Trinity Bay and that's only while the bay is flooded and the salinity is abnormally low."

Chen didn't bother to code his words. There were first-rate security protocols on both ends of this webcall. And today the communications lines in Houston would be clogged with references to the catastrophe. A data miner didn't stand a chance of sifting this particular conversation out of the haystack of hysteria.

"Will it choke the reservoir under Painted Horse?" Evan asked.

Chen steepled his hands. Beside his elbow, the workstation displayed what looked like a child's multicolored doodling, but it was the Zofia's path in the sea of air yesterday, recorded by the flight computer. "When we overlaid your path on the drainage basin of the river, your warm spots were all places where water and oil coexisted—such as a pipeline with a leak, a flooded service station."

Leo raised a bushy eyebrow, evidently starting to comprehend what Evan had been doing yesterday.

"Oxygenated water was present in those places, whereas the oil reservoir is anaerobic. I don't think the nanoplasm will proliferate there—but it is too early to tell for certain."

"Let's consider what we do know with certainty," said Evan. He made a deliberate, summing-up gesture with his hands. "It changes oil, or rather, changes some or all of the various fractions of petroleum, such as gasoline—into materials with polymer properties.

"Once the nanoplasm runs away, it consumes conventional structural materials. The painted Horse platform will never be the same again. Liberty either! But it's less than the all-consuming plague everyone fears. It might be a way to convert oil into polymeric materials with less environmental costs than the conventional process. Less pollution and heat. Less monetary cost than having stringent heat and pollution controls in a refinery. Less impact on an overheated, overpolluted world." Evan paused for dramatic effect. "Everyone else is still riveted on containment and control. No one else is thinking about exploitation yet."

"The nanobug must be patented to the max," Leo pointed out.

"Perhaps a nanoplasm with this talent escaped from N-ergy," said Chen, "but possibly it came into being as nanobiotechnological entities mingled with pollutants in oxygenated flood waters."

Evan remembered the roiling water below the Lake Livingston dam, where he had found the first hot spot.

"Hold on just a minute!" said Ann. "Dust from China and viruses from Africa show up in North America. How can we be sure this thing won't spread by air?"

Evan's fingers tightened on the pen in his hand. He realized he was holding the pen with the same severe grip with which he had held the control stick yesterday. "What did they find?" he asked Chen.

"Nothing," the man on the wall said. "Nothing. Some interesting DNA fragments but nothing alive. It will not travel that way." Zeno smiled faintly. "Jeremy has not been able to create any riotous plastic here in the lab, none at all."

Evan hadn't realized how his spine had been a knotted rope of tension, until he felt some of the knots loosen.

"The best models lead us to believe it won't survive in the air," Chen told the others. "And so does a serendipitous test yesterday, a hard one."

"Test?" said Ann.

Leo pointed to the Zofia's picture. Ann uttered an expletive more often heard in the oilfield than in the boardroom. But she got her feet back under her quickly. "I see. Now what?"

"Ann, your company owns oil leases in Trinity Bay, and has the universal profitability and environmental problems with oil. Your company, Leo, is the best player in the underwater marine research and robotics business, bar none. Zeno, this problem is squarely in your ball park."

Evan sipped coffee that David had made the way he liked it, pungent with cardamom, a taste he'd acquired, along with a taste for danger, on the Arabian Peninsula. This was the most volatile opportunity of his entire career. Unlike his actual and virtual guests, did not have the engines of a corporation or a university driving his endeavors. Only the great engine of fate itself.

"Natural oil seeps exist on the bottom of Trinity Bay. And now the nanoplasm is introduced. Before the salinity returns to normal, it'll be a garden of Eden down there, for the nanoplasm. A week or ten days is a long time for microbial evolution."

Zeno nodded, telegraphing agreement.

"Since Ann's company owns the leases on the affected seabed, and is understandably concerned about the integrity of the wells, nobody has a better right to go in and assess the situation. We can see how this cyber-microbe flourishes. We can observe evolution diversifying it. And take advantage of it."

"Behind the government's back?" asked Ann.

"The United States government can't bed down with your corporation, Ann, or with Leo's. But my company can be a discreet go-between," Evan assured her.

"Is Rice aboard?"

"Not exactly," said Zeno Chen. "I am aboard. And thanks to Mr. Gage, I have a head start on every other researcher who will be attracted or assigned to this problem."

Ann nodded. Delighted, Evan let the corners of his mouth lift in a smile. He knew he had Ann on board now; he had all three of them.

"It's a risky proposition," said Ann, "but it might be very rewarding."

"It's exciting as all hell," said Leo.

Evan nodded. "It's much like the day after Trinity the first time around." ■

GUEST BOOK REVIEW

Volcanoes in Human History: The Far-Reaching Effects of Major Eruptions
By Jelle Zeilinga de Boer and Donald Theodore Sanders
Princeton University Press ($30, 295 pages, hb).
Reviewed by Richard A. Lovett

Historians usually downplay natural catastrophes, preferring to focus on socioeconomic explanations for the rise, fall, and evolution of the world's cultures. De Boer and Sanders, however, argue that the impacts of volcanic eruptions (a future book will deal with earthquakes) have reverberated through history in myriads of manners.

Even science fiction and fantasy may have been shaped by volcanism. *Frankenstein* was written the gloomy "year without a summer" that followed the eruption of Tambora, an Indonesian volcano that in 1815 produced a blast thirty times larger than the celebrated 1980 eruption of Mt. St. Helens. And Tolkien's *Lord of the Rings* Trilogy drew on the mythology of Iceland—whose culture is shaped in part by catastrophic volcanism.

Volcanoes in Human History examines two volcanic cultures, Hawaiian and Icelandic, plus seven of history's most significant blasts. The earliest is Thera, a volcano whose eruption 3,500 years ago may not only have inspired tales of Atlantis, but may also have brought the art of writing to ancient Greece, via refuges fleeing the devastated island of Crete. Eventually, the Greeks would undoubtedly have learned to write anyway, but it's interesting to speculate how different Western history might have been had Thera remained quiescent and allowed the center of Mediterranean civilization to remain, undisturbed, on Crete.

Other volcanoes covered by the book include Mt. St. Helens, Vesuvius, Krakatau, and Pelee. Alternative-history fans will enjoy speculation that the 1902 eruption of Pelee may have been a crucial factor in the decision to route the Atlantic-to-Pacific canal through Panama, rather than volcanic Nicaragua. People who are already familiar with these eruptions will find their treatments a bit cursory, but this book is a good introduction to both volcanology and volcano history. It's entertainingly written and even volcano buffs will find new tidbits about each of the eruptions.■

Illustration by Broeck Steadman

It's comforting, but not necessarily correct, to think of ourselves as the Finished Product of evolution. . . .

Still Coming Ashore

Michael F. Flynn

Late in the summer the folks who sign up for the museum trips would start dribbling back home and not a few of them stopped at the Irish Pub after their meetings and presentations and such to lubricate throats gone dry with all that academic talk. They are an earnest folk, who place their guided safaris and jungle tours on a par with Burton and Schliemann and Stanley. Why, old Tim Kennedy booked passage on a cruise ship to Antarctica, and when he came back you would have thought he had been with Scott discovering the Pole; saving only that Scott did not come back with a carousel of 35 mm. colored slides, nor come back at all, now that I think on it. A hard end that was, but at least he did not pester his neighbors.

So I listened with only half an ear to Eena McCoy as she cracked on about her *adventures* in Australia's Northern Territory, and this in itself was more ear than the tale was worth. I ordered a pint of Guinness and settled myself to await The O Neil. The two of us had it in mind to shoot a rack or two of pool that night and help The O Daugherty diminish his stock of the Brew, lest it place a burden upon him, come the end of the tax quarter.

"I just thought it was *wrong*," Eena said. "Them sitting up in the branches that way, looking down on us like they were lords of creation. Someone ought to keep an eye on them. They're cheeky little buggers, giving you that *sideways* look when they slink off."

The O Daugherty Himself was a stocky, barrel-chested man who slicked his hair down and parted it in the middle. He wore a white apron with a bar rag tucked into the strings. As he dried off a glass he said, "I'm sure they didn't mean any offense, Eena." And he favored me with a wink, though I didn't get the joke quite yet.

"Sitting up there croaking like frogs," Eena went on as if Himself had not spoken. "Staring at us." She displayed indignation. "They just didn't know their place!"

Now Eena had been born shanty, the same as most of us; but she had married lace curtain and ever since has cultivated a sense of wounded propriety. The list of those who "didn't know their place" was in her view an alarmingly long one. I beckoned O Daugherty in my usual restrained fashion—holding up an empty pint and crying, "Today! Today!"—and asked him while he replenished it who "Eeney-meaney" was talking about.

"Why, the fish," he said.

"Fish, is it?" He nodded and I sipped my stout. "In the branches, were they?" Another nod. Another sip. "And these are the branches of trees we're speaking of, and not those of rivers?"

"Trees, it was," he agreed.

"Now what," asked Danny Mulloney in somewhat belligerent tones, "would a herd of fish be doing in a tree?"

"Could be," I suggested, "all the tourists paddling about have scared them out of the river."

"Do fish run in herds?" wondered Himself.

"Climbing trees and all," said I, "they might go in flocks."

"Well," said Eena, "they should get the flock out of the trees. They don't belong there."

"Ah, it's only some sort of mudskipper or lungfish," said Doc Mooney, who sat across the oval bar from us nursing a gin and tonic and his own irritation. "Eisley wrote of 'em, just as Eena has described. They crawl out of the water to cross mudflats. It's a sur-*vi*-val me-cha-nism—" Doc enjoyed drawing out his words when he wanted to taste the syllables of them "—useful in times of drought."

"They weren't wriggling across the mud," insisted Eena. "They were perched in trees, croaking like frogs. It wasn't *right*."

"Climbing the nearest tree does seem going a bit too far," said Danny.

"Impudent," said Eena, nodding her head vigorously.

"Hardly one of your 'survival mechanisms'."

Now that last was Danny's sly dig against the Doc, who was known to favor the theory of evolution. Doc twitched his moustaches and fell silent, for even he could see no good reason why a fish might want to climb a tree.

Inspiration came to me from the stout, the drinking of which caused me to tilt back my head, giving me a glimpse of the rafters above. "Why, there you have it," I said, and in such triumph that half the patrons studied the ceiling to find the answer. "And which of the poor fish's natural predators," I announced, "would ever think to look for it perched way up there?"

Doc struck the bar with the flat of his hand. "By God, Mickey, you have the right of it! A tree-climbing fish would have a reproductive edge on her sisters. Sure, it's a comfort that Mother Nature is still out there puttering away, and she hasn't given up just because her first try ended up with the likes of you spalpeens. It was Eisley who said it best: '*There are things still coming ashore*.'"

Eena shivered in an exaggerated way. "I don't find that a comfort at all."

Danny frowned, "D'ye mean to say that this evil-lution thing is still going on?"

Doc waved a hand, encompassing the entire bar. "Ah, and why do I bother elucidatin' to the likes of you?"

"Someone *should* keep an eye on them," said Mousie Moore, who sat apart at a table in the corner.

Now for a confused moment, everyone thought she meant that it was the denizens of The Irish Pub that needed watching, nor would she have been entirely wrong in proposing that, but it was the fishes in the trees of which she spoke. "They're out of place, those fish of yours," she said to Eena. "And when something's out of place, you never quite know what it will do." Yet no sooner had Mousie drawn everyone's attention than she flushed and turned to her companion, the which was a corned beef sandwich and a glass of bitters and nothing else beside.

It was painful to watch Mousie so alone as that, for she had been as lively as any of us. The neighborhood had always called her Mousie because she was so small, but of late she had become quiet and reclusive, as well. Not that any could blame her. She had been on one of those museum trips I mentioned—but one that broke the rule of bourgeois safety, for the schooner had been wrecked in a typhoon in the southern Philippines. Mousie alone had been rescued, and that only after a month on some uncharted island. She never spoke of her ordeal—or indeed of her fiancé, who had set out with her and not come back—and she had turned since then to an inner world where no one else could go, saving only Father McDevitt.

Doc spoke up to fill the silence that Mousie had brought to the conversation. "Mud skippers are nothing so bizarre," he groused, almost to himself. "Just another evolutionary gambit."

Danny challenged him, as we all feared he would. "Then why aren't *people* still evolving? What I mean is, if we started as apes, as you suppose, and then got a little brainier and then even more brainier, then where are those giant-brain mutants like you see in those science fiction shows?"

"Human evolution," said Doc sternly, "doesn't necessarily mean bigger brains." He favored Danny with a significant glance, but did not editorialize. "Ever since our ancestors dropped down from the trees onto the African savannah—"

"They did no such fool thing as that!"

The words were those we awaited from Danny, for this was not the first time that he and Doc had waltzed to that particular tune, but the tones were alto rather than tenor and, after a moment of confusion, we turned to the booth behind him, where sat a short but wide woman, groomed in that practical manner more commonly found in fields than in classrooms.

"And did they not?" said Doc to her, for he always gave his targets grace to retreat. "And I suppose you would be knowing all about it?"

The woman called for the replenishment of her schooner, the which was filled with Bass. "Perhaps. Enough to know that the usual evolution story is utterly improbable."

"Haw!" said Danny, but Doc was not to be distracted.

"Is it, now?" he said, cocking his head. "And you would be. . . ?"

"Kateri O Rourke," the woman said. "I'm delivering the Hartsfield Lecture this evening in the auditorium."

Doc gaped at her open-mouthed, for the Hartsfield Lectures were funded and presented by the Paleontology Department at the University, nor did the Speakers Committee invite strangers from off the street to deliver them. Danny, on the other hand, could not restrain himself. "Haw!" he said again, slashing the air with his forefinger. "'The pro from Dover!'"

"And that would be the lecture," said Himself as he filled another pint for Eena, "with the very long title?"

O Rourke's grin turned impish. "*The Upright, Naked, Fat, Sweaty, Oversexed, Weeping Ape with Hemorrhoids and Lower Back Pain*?"

"Fat?" said Eena, with just a touch of umbrage, but O Rourke paid her no mind. She left her booth to take a seat at the bar, more or less at the head of it so that she could address all of us at once. Now here was a woman, I thought, accustomed to lecture. Myself, I had been lectured by many women—and over some of the very adjectives O Rourke had employed in her title.

"Doc," she said as she assumed her seat. "They call you Doc, right? You must have heard of Lucy. . . ?"

"Lucy Mulligan?" guessed Danny. "She from down the Points?"

"No," Doc told him. "Professor O Rourke means one of Leakey's fossils. The oldest human ancestor ever found. In Africa, it was."

"The Afar region of Ethiopia," said O Rourke. "That's right. Five to eight million years old—and, since that's about when the microbiology folks tell us that apes and humans parted genetic company, it's as old as any *human* ancestor is ever likely to get. Not that Lucy herself was human. She was an animal, just like her gorilla cousins—except she walked upright, and that is a very peculiar thing to do, as you would see if you tried to name another mammal that does it. Gorillas sometimes rear up for display, but normally they go about on all fours, using their knuckles. Yet, there was Lucy, standing up, at the very dawn of Our Kind."

"I have always understood," Doc said in those precise tones he employs when defending a position, "that an upright posture enabled our ancestors to spy danger approaching, so they could run away in time."

O Rourke set her schooner of Bass aside, half-finished. "Run away! Like Monty Python's knights? But consider Lucy. She was the original Bigfoot. Her feet equaled 35 percent of her leg length. Ours are only 26 percent. Her gait would have been so different from ours that it's not even clear that we should call it 'walking.' Run away? It would have been more like waddling away wearing a pair of blooming swim flippers. That's why I say that bipedalism is a peculiarity," O Rourke concluded. "For when you look at the earliest phases of it, the adaptive advantage is not very obvious."

"And those other peculiarities?" Himself asked while he dried the countertop. "The hairlessness and all?"

"The savannah sun can be cruel hot," Doc said. "Who needs a fur coat?"

"But at night the savannah can be 'cruel' cold," O Rourke reminded him, "and no other mammal there finds its fur inconvenient. Doc, not even *Darwin* thought that natural selection could explain human hairlessness. And our sweat is odd, too. *Salt water*—and not a fine sheen just enough to cool, mind you, but great dripping rivulets. Picture it. Our ancestor spies danger, and away she runs—waddling on huge feet, naked to the African sun, sweating rivers, losing salt as she dehydrates . . . *And she doesn't even know it.* Tell me, what other animal needs a doctor to warn it of sodium deficiency?"

"Well," said Doc cautiously, "we do add salt to our food. . . ."

"Yes. But we have no *sense* of it. We sense hunger. We sense thirst. And when these appetites become too intense, we will risk anything, even death, to satisfy the cravings. But not salt. We have no 'hunger gauge' for salt—and millions of people die every year because of it, especially in the poorer half of our planet."

"I want to know," said Eena, "why you say humans are fat. *I'm* certainly not fat."

"Compared to an ape, you are," O Rourke assured her. "A fat monkey looks like a starving human. Think how *chubby* our babies are compared to gorilla babies. That's because we humans wear our fat like a set of 'long john' underwear, while most other land mammals carry their fat internally. Pick up a dog or a cat sometime and you will see how loose their skin is. But human skin is bound like wallpaper to a subcutaneous fat layer."

"Doesn't the fat layer provide the insulation we lost with our fur?" suggested Doc.

"But when we are cut, we have to hold the edges of the wound together with a suture or an adhesive bandage or else the skin will not grow together properly."

"Lower back pain," suggested Himself.

O Rourke smiled. "I have to save something for the lecture. But I think you see that there are an awful lot of selective *dis*advantages for the standard evolutionary story to explain."

Danny said, "Haw!" again, and Doc gave O Rourke the squint-eye, like he does sometimes, when he meets disagreement. "Are you saying that humans did not evolve like other species?"

"When did I say that?" O Rourke replied. She was a large-boned woman, but managed to look pixyish when she grinned. A disingenuous grin, I thought, because she had surely been leading Doc along, and Danny, too. "No," she said, "I'm saying that humans did not evolve . . . *on the savannahs.*"

Danny had started in on his fourth "Haw!" of the afternoon and nearly strangled at having to swallow it.

"You see," O Rourke continued, "something else happened eight million years ago. A rift valley opened up and the ocean came pouring in. What are today the Danakil Highlands in Ethiopia became 'the Danakil Islands,' and something that was very much like an ape, but not quite—and very much like a human, but not quite—found itself trapped. Being arboreal, you see, they had retreated as the water level slowly rose. Some had retreated to the west on what remained the mainland and became gorillas; others retreated east into the Danakils and . . . became us. It's those isolated island populations that diverge the fastest, as Eldrege and Gould—and Darwin—noted. When our ancestors did come down from the trees, it was not to the solid, dry, hot savannah, but to brackish mangrove swamps."

Mousie Moore dropped her sandwich to her plate and turned to gape at the woman.

Eena McCoy sniffed and said, "I've been to East Africa on safari and it was as dry as the bones they pluck out of it."

"Yes." said O Rourke. "*Now* it is. But

eight million years ago, it was a different world. Quite lush, really. Our ancestors had to adapt to a semi-aquatic environment or perish. 'Bigfoot' or no, walking upright must have been quite the advantage to 'Lucy's Mother' as she waded about in chest-deep waters, for the very good reason that otherwise she would have drowned. In fact, feet as big as swim flippers must have had considerable merit. To this day, some human children are born with webbed fingers or toes; and some peoples—the pearl divers of Japan, the Orang-laut of Malaysia—maintain an aquatic lifestyle, spending many hours a day in the sea. Our blubber provides buoyancy as well as insulation—as it does for whales and dolphins. As for our lack of salt-hunger, if we spent most of our time immersed in the briny swamps and ate food that was rich in salt, our biggest problem would have been to shed the excess. That is why we sweat like we do. Dehydration wasn't a problem in that milieu. And then there is our permanent state of heat. . . ."

"Speak for yourself," said Eena, but O Rourke ignored her.

"Oestrus is almost universal among land mammals, and has worked quite well for millions of years; but humans are horny the whole year 'round. But that would make perfect sense if our ancestors spent their lives the way the Orang-laut do today. The pheromones that announce oestrus are airborne and would be washed away in a semi-marine habitat."

"A pretty theory," said Doc, who was not about to let go of orthodoxy quite so easily. "Do y'have any *proof* of it, though?"

O Rourke muttered something about "dinosaurs" that I took to mean those living fossils embedded in the sediments of university faculties, rather than the more usual sort. "Do you mean," she said, "beside the fact that a dozen adaptations that would have been deadly on the savannah would have been a positive benefit in the water? Sudden infant death syndrome. Sleep apnea. But we can breathe through our mouths—take in great gulping breaths when we break surface—even if the price is the occasional Heimlich maneuver."

"Then why haven't we lost those 'water-suited' traits," Doc wanted to know, "once we moved to the land?"

O Rourke shook her head. "Lord save us from our friends. Doc, natural selection is opportunistic. It isn't a search engine. It does not conjure up a trait simply because it would be *nice* to have. It makes do with what is on hand. Our feet have gotten a little shorter. Our heads sit better atop our spine. We've lost most of the webbing in our fingers and toes. Perhaps the next phase in our evolution will be some feature that keeps us from 'swallowing down the wrong pipe.' It won't be a restoration of the old feature, though—the soft palate used to separate the breathing nose from the swallowing mouth—but something opportunistic, like the panda's wrist bone becoming a 'thumb.' So you see, young man," and here she turned to address Danny, "humans really do evolve in other directions than mere brain size."

"A marine ape," said Doc, still in doubtful tones.

O Rourke turned to him. "Why not? There's precedent. Something like an elephant once became a manatee. A dog became a seal; and a bear, a walrus. A tapir is very nearly an aquatic horse; and a babirusa, an aquatic pig. Consider the hippopotamus, as well. So it is not beyond imagining that an ape once took up swimming."

"Not beyond imagining," insisted Doc, "but that doesn't mean it's true."

"Well," said O Rourke, with a little less patience in her voice, "there is even a prior case. *Oreopithecus* is a fossil 'swamp ape' from Italy that failed to readapt when its niche dried up. It's not a direct ancestor of ours, but . . ."

"Even so . . ." said Doc.

"*Do you want proof?*" demanded

Mousie Moore in a harsh voice that hardly seemed her own and which brought a silence into which she could shout in tight-fisted anger as she rose from her chair. "Do you want proof? It's all such a game to you! An intellectual theory! But it's not a theory! It's ugly, and it's real!"

The Mouse That Roared. . . . But that is really a fearful thing when you think on it. As Mousie herself had said earlier, when things are out of place, you never quite know what they will do.

After a few startled moments, Himself said, "Is it something you would tell us?" in a voice more casual than the concern I saw in his eyes.

Mousie studied each of us, one at a time, in silence, and I hope never to be studied in such a way again, for there was something of a judgment in her gaze. Her eyes lingered longest on Professor O Rourke, who was a stranger and who had made herself, in some unknown fashion, the object of Mousie's anger.

"You'll all hate me," she said at last. "I've committed the most horrible sin." And then, as if that sentence had been sufficient justification, she hunched her shoulders forward and came to the bar. The seat she took was The O Neil's, beside my own. I smiled at her in a welcoming way and Danny, upon my other side, leaned past me to place a hand on her forearm.

"God loves you," he said, low so that Doc could not hear, and Mousie gave him a fleeting smile. But when Himself placed a fresh glass of bitters before her, she shook her head.

"No, I'll need a clear head for the telling." But she stared long at the glass before she spoke, as if uncertain whether she might change her mind.

"Colin's mother," she said after a time, "has never forgiven me, for he would not have gone on that voyage except to accompany me. He never had my interest in sailing and wood lore or in strange lands and people, but he had an interest in me, and that was enough to take him to the ends of the earth. You may argue all you want about 'true love,' but the mark of it is this: that a man will endure excruciating boredom for the sake of his beloved. Colin was fun to be with. He was playful when that was called for, and that means when things were most serious. I miss him every day, and I will miss him every day yet to come."

"He was a fine lad," Himself agreed, "and had a good tenor when the singing came on."

For myself, though I said nothing to Mousie, Colin always struck me as too impetuous and too inclined to believe that everything would work out for the best. But he had won Mousie's heart and I had not, so who is to say that he wasn't right in believing that? A man can be too careful when it comes to the colleens and jealousy now was pointless. Colin would, in Mousie's eyes, never grow any less perfect, for he had no more opportunity for error and mistake; and every suitor from now to eternity would have to compete with his untarnished memory. In this one regard, the old pagans were wiser than we, for an early death means undying fame.

"Now the beginning of the voyage was unremarkable," said Mousie, "save to those like me that thrilled at the exotic plants and animals that we saw. Colin stayed aboard our ship and read fantasy books. Oh, he would listen politely to the rest of us when we returned each evening and even ask a question or two, for he was not utterly incurious, only his curiosity ran down different avenues than my own. Space ships and planets and aliens . . . But there are no museum trips for that . . .

"We had neared the farthest point of our excursion—those reaches in the South Sea where the islands of the Philippines begin to scatter like flotsam on the waters while those of Indonesia just begin to appear and sovereignty is an approximate and theoretical thing—when the storm welled up and caught us all by surprise.

"At least it caught us passengers by surprise. I suppose the crew had received some word, because the ship did begin her turn a day before our agenda called for it, but I never had the chance to ask. We flew before the wind, as the sky steadily blackened and the sea took on a peculiar, reddish cast. The wind freshened and the waves rolled higher. Some of the passengers complained as they gripped the rails and fed the sea birds with their half-digested meals and said they would sue the Society once they had gotten home. They didn't understand how cruel and uncaring Nature is. They thought it was all post-cards and Disney. They might have learned better but if they did, it was a cruel lesson, for the ship broke deep and took water.

"The crew came running on deck to put out the life boats. We were all wearing flotation jackets, save a few who would not be bothered. Mr. O Daugherty, I'll never understand some people. Can you explain them to me? Colin begged them to put their jackets on, but it was as if they could not credit the need for them, as if none of it was *real*. Maybe it wasn't. It didn't seem quite real to me, either.

"I'm sorry to say that some of the crew behaved badly and fought for space in the boats—and some passengers, as well. But none of it mattered in the end. The ship went down and the boats capsized in the rolling seas. Noble or craven, they all drowned, or they were carried away like driftwood into the trackless ocean. Men, women, even a few children who had come with their parents. I knew most of them. We'd eaten breakfasts together; we'd gone on nature hikes at the islands where we stopped."

"Ah, the poor creatures," said Himself, shaking his head.

"When the storm finally blew out, I found myself hanging to a deck chair on a smooth glassy sea. The sun was . . bright, and the water blinked an flashed as the small ripples caught th reflection. After a while, I had to clos my eyes against it. Sometimes, just before I fall asleep, I still see those flickers as if they've been burned by a laser int my retinas.

"I don't know how long I drifted There was a night, but maybe there wa more than one. I think I fell asleep though I never lost my grip on my littl makeshift raft. Then, one day, or mayb it was only a few hours later, I found myself tangled up in the mangrove roots o a shoreline swamp where a stream o fresh water ran down from somewher in the interior. Oh, God, that water tasted sweet! Oh, God, the shade of thos trees was cool! You people don't know no one can possibly know, how swee and cool such a thing may be.

"The whole time I was in the water did not form a thought. I never thought 'Oh my God, I'm in a typhoon!' I neve thought, 'I'm drifting on the ocean!' never thought, 'I must make for the sight of land.' I don't even remembe how I went from boat to ocean. I suppose Colin and I were swept overboar by some great wave. We were holdin tight to each other at the time, but the ocean is stronger and we were torn apart.

"So you must understand that when all those rational parts of me reassembled on that unfortunate shore, it was as if only moments had passed. A series of disconnected tableaux—then I was on the shore. It was that sudden a thing.

"The sun was already past its peak when I began to realize that I was alive. I called out several times, but answer came there none. And so I imagined that the others had made their way to other islands and that we all must work to find one another." Mousie paused and looked very hard at the glass of bitters before her. "It was a useful fable. It gave me a reason why I ought to live. It seemed wrong, somehow, that I had lived when everyone else had drowned, for there was no special merit to Mousie Moore.

"I went in search of drier land and wood to make a fire. I would have to make a bow-drill for that, but at least I knew how to do such a thing. It was when I was gathering sticks that I found Colin, and the other.

"Colin?" said Doc. "But didn't he. . . ?" And his voice died as he considered how a drowned man might arrive on a shore as easily as a live one might.

"There had to be some special meaning to that," Mousie continued, as if Doc had not spoken, "that Colin and I had drifted to the same place over all that distance. Of course, maybe the island wasn't all that far from where the ship had gone down. I don't know. He was unconscious and a great ugly gash on the side of his face showed where something had cut him.

"I dragged him to the higher ground, where I had placed my little stack of wood, and then I went back for the other.

"I had thought him one of the crew, for he was dark, but then I saw that he was naked as well, and thought perhaps he was a native of the region who had also been caught in the storm. But when I came closer I saw that it was only a very large monkey, one of those with the peculiar noses."

"A proboscis monkey," suggested Doc.

"Yes. I had read of them in the guidebook. That great, funny nose—except it is not so funny as all that. This was a giant of its kind, perhaps four to four and a half feet long. I backed away quickly, for it is never a good idea to get close to a wild animal, especially a large one that may be panicked. I thought that it might be ill as well, for it had lost most of its fur, save only patches on its head and shoulders and on its lower legs.

"I returned to Colin and tried to get him to drink some fresh water that I had gathered in a palm leaf. He coughed and sputtered, but he swallowed a little, and then sighed and lay back again. I went back to the shore and retrieved the deck chair I had clutched. I thought to use the canvas to fashion sun shades. Then I thought that if Colin and I had been carried here by some current, perhaps other flotsam had been, too. So I made several trips back and forth, exploring a little each way along the shore. Perhaps I should have stayed at the shoreline and made a more thorough study, but I disliked leaving Colin alone. Each time I returned to our little refuge, I expected to find that he had vanished. I began to be afraid of being alone.

"I found a few things. A life preserver, some waterlogged books, a man's shoe—a left shoe. I've always wondered . . . I've always wondered what happened to the right one. I don't think I was right in the head.

"I found a dead tree further inland and broke some branches into punk and put it in the notch of the board I had made earlier. I used a vine for the bow, but it broke and I tried a different sort of vine, but that broke, too. Then I teased out some cords from the canvas of the deck chair and used that. I sawed the bow back and forth, back and forth, and the drill whirred one way, then the other. I fell into the rhythm, I *became* the bow. Later, I discovered that I had worn a hole into the chuck I used to press the drill down. It took . . . I don't know how long before the punk began to smolder and finally lick into a small finger of flame. No newborn was ever suckled more lovingly than that tiny flame. I understand now why the ancients maintained sacred colleges for no other reason but to keep a fire burning. You don't want to do that more often than you must.

"I had piled a quantity of wood by the site so that I could feed the fire, but once it was crackling nicely, I went in search of more to tide me through the night. It was already growing dim, and I did not want to stumble around on a tropical island in the dark. There are too many venomous things that live there. It was on one of those forays that I realized I was back at the place where I had found Colin. I looked and I saw that the giant monkey was gone, too. I wondered at the time if the tide had carried it back out to sea or if it was now at large on the island with us.

* * *

Colin came to while I was arranging the fire. I noticed the reflection of the flames in his eyes and realized that they were open. How long he had been looking at me, I don't know. Probably not long. When he saw that I had noticed him, he said, in an awful croak, "Where are we?" I told him we were on an island, I didn't know where, and he said, "Anyone else?"

I told him that I hadn't found anyone yet. This was before I concluded that I never would, but I think Colin knew right away, for he closed his eyes and looked sad. A few minutes later, I heard his familiar snores.

Somehow, I did not think I would sleep. There was so much to worry over. Fresh water we had. Fire we had. But food . . . What was safe to eat? There might be predators about. Venomous snakes. Colin's wounds might become infected. I could almost *feel* the mold growing on me. And rescue. Surely, I thought, they must be prowling the seas looking for survivors, but what could I do to speed it? I walked to the shoreline again, just to assure myself that a passing ship could see the fire. Then, returning, I took off my wet clothing and hung it on branches over the fire to dry. I shivered for a while until the flames dried me. The heat on my bare skin was so relaxing, the warmth and the smoky smell so soothing, that I soon did fall asleep.

I was wakened by a ship's foghorn. At least that's what I thought it was, and I came out of my doze with a start to find the night beyond the fire blacker than I had ever imagined it could be. I wanted to run to the shore, to wave a flaming brand, so the ship would not sail on past, and I had just reached for a branch when the sound came again and I saw that giant monkey squatting just across the glowing coals from me. I froze.

Up close, the appearance of illness was more pronounced. Its hair had fallen out from its chest and legs, leaving only its head and shoulders covered. *His* hair and *his* head, I should say, because he was quite dramatically male. He threw his head back and I then realized that there was no ship, for his dangling nose flared straight out and blared several notes, like a bugle call.

When I didn't move, he honked again and shook a branch he had in his hand. I thought he meant to strike me with it, but he threw it into the coals and let the flames come alive. Then he honked that same bugle call and shook another stick at me and I understood. While I had been dozing, I had allowed the fire to die down and my . . . visitor was demanding that I build it back up again.

("Cheeky," said Eena to the bar in general.)

Maybe (Mousie continued), but he had a point. Why he didn't do it himself, I don't know. It was obvious that fire did not frighten him, and that disturbed me. Wild animals do not willingly draw near a fire. Everything in evolution teaches them to run from it. Yet, here was this monkey squatting quite close to the smoldering embers, and making no move when they licked into flame from time to time.

I was not about to argue with a giant monkey, especially when the monkey had a point. So, I pulled more sticks off my pile and laid them in the fire pit until the flames were built up nicely. At that point, the monkey turned his back to me and stared into the forest behind us. I did not know what he was looking for, but he seemed quite intent. I could see nothing myself, as my eyes were dazzled by the firelight. I suppose that's why the creature turned his back to it.

("Clouded leopards," suggested O Rourke. "They are the natural enemy of the proboscis monkey.")

(Mousie shrugged.) It may have been leopards he searched for. He never said.

When his back was turned, I stood to retrieve my clothes. You recall that I had hung them up to dry by the fire. The motion attracted his attention and he turned abruptly, expecting I know not what. Perhaps not what he saw, for he too leapt to his feet at the sight of me and his nose straightened out again in another of those bugle calls of his. Nor was that the only part of him to straighten. He seemed . . . puzzled, I think, as if he did not quite know what to make of me. He took a step around the fire and I squealed. He hesitated a moment and in that moment Colin arose from the shadows with a roar and the monkey started and ran off.

He *ran* off, you understand. On his two feet, just as a man might.

Colin had been awake for some time, for the honking had roused him, too; but he thought it better to lie quietly and see what developed. He and I sat holding one another for a while, for I was quite shaken.

Afterward, Colin and I took turns standing watch and maintaining the fire. Colin thought we had frightened the creature off, but I was not so sure. He had not seemed the fearful sort.

The next day, we set out to explore our prison. We did not want to huddle around our camp for weeks only to learn that there was a town or village over the next hill. Before we did left camp, we built a bonfire on the beach where we had washed ashore, and heaped green wood and leaves atop it to encourage the smoke. We did not want a ship to pass while we were exploring elsewhere.

It was hard going, ourselves being shoeless and Colin dressed as lightly as he was. His tee shirt was torn and ragged, nor were his shorts the sturdy sort that I usually wore on excursions. He seemed recovered from his ordeal, but now and then, when he thought I was not looking, I caught him wincing in pain. Both of us stubbed our toes badly on rocks protruding from the soil, but if that was the worst that happened there, I would have counted myself fortunate. I suggested we use the one shoe I had found, taking turns with it. He was not sure I was joking. I don't know if I was.

The ground became higher as we walked inland. I stopped now and then to lay some sort of marker to indicate the way back. We found several coconuts on the ground, which we took with us, and also some berries and fruits that might prove edible. Every now and then we heard sounds off to our right, like an animal in the bush. A leopard would bear watching, but a wild pig I feared most of all, for pigs do not shy from attacking people.

We finally reached a hilltop from which we could see most of the island, as island it proved to be. I had rather hoped it would be a peninsula attached to some prosperous mainland, but the gods were not smiling. Below us lay a dense forest, looking like a green carpet of lichen. To the north, a rocky promontory rose like a fortress, blocking a part of our view. A submerged atoll on the west revealed itself by the white rings of surf that broke upon it. The lagoon it created lay quiet and undisturbed. In the far distance—southward—a black flyspeck marked the horizon. Otherwise, the ocean was a vast, bright desert.

I had hoped for some sign of habitation and so gasped in delight when I saw a column of smoke rising in the east; but Colin pointed out that it was our own watch fire and, after that, the sight depressed me. It looked so much more lonely in all that vast emptiness. The isolation quite overcame me all of a sudden, and I sat down hard on the hilltop and wept. Colin crouched beside me and placed his arm around me. He didn't try to say anything. Lies are no better than the truth for comfort.

("Here," said Himself, handing Mousie a handkerchief.)

Thank you, Mr. O Daugherty. God, I hate blowing my nose anymore. It always sounds like . . . Sometimes, it seems too real to me; as if I were still there and I only *seem* to be back in the old neighborhood. The tropics are so much *noisier* than the temperate forests, at least at dawn. Why, the redwood forests in the Cascades are like hushed temples! But that island chattered like a market bazaar. The birds didn't sing; they cried out raucously to one another. In the midst of it, from time to time, I could hear the hooting of my visitor of the night before. At least I assumed it was him. But all that noise, from our perch atop the hill, was but a whisper in the vast silent ocean that spread to the horizon. It was like my campfire of the night before: a little pool of light surrounded by endless dark.

When I had cried my despair into silence at last, I let Colin lead me back down the hill. Rationally, our only option was to die, and I supposed from that point on that that was how the matter would end. As it happened, I was half-right.

It almost ended on that very day, when we started a snake.

Now, not every snake in the tropics is poisonous, but that is the way the smart money bets. And maybe it would not have struck us. Snakes have their own concerns. But there it lay in our path, and there we stood in our bare feet and it began to wriggle toward us—fast. But that monkey burst from the bushes beside the trail, swinging a club in a great blur, and smashed its head. Snakes are stupid. They don't know when they're dead. The headless thing on the trail writhed and wriggled and the monkey danced around it, hooting and smacking it from time to time with his club, then jumping back as if the thing could still bite. Then he grabbed it by the tail and held it, still wriggling, and, in straightening, saw us.

He hooted some more and waved the snake's carcass about. He even parted his jaws, which he had not done before, and uttered a different sort of call—from his throat—in the process showing teeth that I would not care to be bitten by.

Colin and I held very still, hoping the creature would run off. Instead, he fell suddenly silent and stared at us both closely. When he took a few steps closer, Colin pushed me behind him, but the monkey did not attack. He stood directly before Colin and stared up into his face, which was hard to do, as Colin was so much the taller. He reached up and touched Colin's nose; then he hooted some more and danced another few steps as he retreated. He wagged the snake in the air and turned to go, but a little ways farther on, he turned and hooted at us again. I could see that he had an erection.

"What was that all about?" Colin asked when the monkey had disappeared from sight. He was rubbing his nose where the creature had stroked him.

"I don't know," I admitted. "There was nothing in the guide books about it." I told him what little I remembered of proboscis monkeys, which was that such monkeys were much smaller and had *much* longer tails than the stump our friend bore, as well as reddish fur all over. "I suppose this one has some sort of disease or genetic defect."

"He fondled my nose," Colin said in some wonderment.

("The female proboscis monkey," O Rourke said, "has a much shorter nose than the male.")

Oh, don't I know that, professor. I read everything I could on those beasts after I was rescued and a lot of what made no sense then makes sense now. He thought Colin was another female—albeit a very large one. Perhaps that was a turn-on. A big, bruising Amazon! That might have been funny, had we known it at the time. Colin as sex object to a monkey. But we didn't know, and now it isn't funny any more.

"You shouldn't have let him come so close," I scolded Colin. "You never know what a wild animal will do."

But Colin shook his head and his face was puckered in thought. "He wasn't an animal," he said. "I saw his eyes. There was someone home."

That was how Colin put it. "There was someone home." I suppose it was all those books he read. Space aliens. Or maybe he had seen too many Disney cartoons. For myself, I've seen chimps and gorillas do some pretty sophisticated things, but they are still only chimps and gorillas.

Colin named the monkey Adam. I told him he was foolish, but he just laughed. "Even if it isn't true," he said, "it ought to be. It makes a great story." One of Colin's aspirations was to write fantasy stories. Oh, he had a job, and a good one, at the import-export firm, and he meant to keep it. His feet were on the ground, but his head was in the clouds. He would have made a fine writer, I think. I would have loved the stories he never wrote.

Adam—we name pets, don't we?—was at the campfire when we returned. He had the snake impaled on a stick, which was braced with some rocks to hang over the coals. He also had several other small carcasses set by.

Colin dropped an armful of wood into the pile for the fire and both of us laid down the coconuts and other items we had pulled. Adam hopped over to our pile and inspected it and gave a short blat through his nose that I had no problem hearing as disappointment. He plucked some of the berries from the pile and threw them into the forest with a flick of his wrist. Some of the rest, he popped into his mouth. That made me angry for some reason and I said, "Hey, that's our food!" But it was as if I hadn't spoken, because he paid no attention. Instead, he bounded into the forest.

Colin was philosophical. "There's no pleasing a gourmet."

Adam had not touched the coconuts, so Colin squatted and beat on one of them with a rock until he cracked its shell. "Where's a can opener when you really need one," he said. Then, careful not to spill any of the juice, he pounded a wedge into the crack to separate the halves. He gave one to me and drank the other himself. Then we both set to the meat of the coconut, using flattish stones to scrape the stuff out.

While we were eating, Adam returned with a fistful of leaves and berries and grubs, and such, which he waved in our faces while he hooted at us. Colin took them from him. "I guess we add these to our shopping list. Did you see the berries he threw away? They were probably poisonous, so cross them off the list." He and I knew not a little relief at that, for our plan had been to test the strange foods by tasting *just a little bit* and hoping that anything poisonous would only make us a little sick and not kill us.

It was during this transaction that Adam noticed we were eating out of the coconuts and his scoldings over our inept food gathering fell silent. He uttered one, high-pitched hoot, almost like a whistle, and snatched the coconut half from my hands. He sniffed it and ran his finger around the inside and tasted it. Colin began to protest, but Adam handed it back to me just as abruptly and instead picked the other coconut from the ground, and turned it over and over while he studied it. Colin pursed his lips and said to me, "I bet he never knew there was anything inside one of those. They were just funny, round, hairy rocks. Here, Adam. Let me show you."

Adam did not want to surrender the coconut until Colin gave him his own half shell. Then he watched Colin pound on the second coconut.

It was a tough nut to crack and Adam

tired of watching. He honked and snatched both nut and rock from Colin. I think he meant, *Let a* man *do it.* He tossed Colin's rock away and instead found another lying about with one round end and one sharp, flat end.

("A hand axe," suggested Doc.)

I suppose. He hadn't shaped it or anything—I inspected it later—but it was one that he knew would do the job, for with a few sharp strikes he had broken the coconut open and attacked the innards with delight. That was when I realized how hideously strong he was. He was smaller than either of us, but I knew then that he could break both of us in two.

That was not a comforting feeling, and I resolved to do better at gathering.

And that was how the next several days went. Colin and I would gather firewood and nuts and berries and the like, and . . . Adam . . . would bring back small game. Often, he came back sleek with water, bearing several small fish that he had caught in the lagoon. And so, one day became the next, until I had quite lost track of how many there had been. There is a monotony to being marooned. It can grow quite tedious and routine. But that is the danger.

We live and die by our expectations. We each carry a bagful of paradigms in our heads. Colin and I began to see ourselves as Mr. and Mrs. Robinson Crusoe, complete with our faithful, if simian, Friday. It never occurred to me that Adam might have had a different paradigm altogether.

There came a day when I felt especially grubby. Colin and I had been digging for roots, crawling about in the underbrush, ever wary for snakes or pigs, and we were covered with grime and clay. And I said . . . And I said, let's go down to the lagoon and wash up.

Adam was still out hunting for the meat course, so we hurried on down to the beach and around to the lagoon, where we shed our clothes—or I should say, rags, by then—and waded into the gentle surf. The lagoon was free of sharks. The reef was a barrier to their entry.

Oh, there is nothing like a tropic sea for sport and play. The waters are warm and teem with colors and riotous life. The Atlantic buffets you, but the Pacific embraces.

In short order, we were rinsed clean, but of course coming clean had not been our only purpose and soon the strokes of the ocean had been supplemented by other even more welcome strokes. There's no point making that face, Mickey. You can't imagine that Colin and I were celibate.

We were thus engaged in the shallows, intent only on each other, when Adam emerged from the waters with a great honk and a spout of water spurting from his nose. He had in his hands a great, struggling, motley-colored fish that he had evidently seized while underwater.

("The proboscis monkey does spend a great deal of time in the water," O Rourke said. "That's why it sometimes walks upright.")

I suppose (Mousie continued) and Adam had that built-in snorkel of his. We never saw him until he surfaced. We thought he was hunting on land, or Colin and I would never have . . . done what we did.

Adam saw us embraced and when he threw his head back to gulp in the air, he let it out not through his nose but through his throat in that roar that I had learned meant anger. I think . . . I can never prove it . . . But I think it was the first time he realized that Colin was another male. He bared his teeth and charged.

Colin was not in a very good position. He had to disengage first. By the time he had turned and pushed me behind him, Adam was on him, driving him up onto the beach.

Colin was bigger, but Adam was stronger and had teeth better suited to a quarrel. Even had Colin won the contest, I shudder to think of what would have followed. The bites . . . Colin actually spent most of his effort simply trying to keep Adam from hurting him, but it was like wrestling with a pit bull. Colin grabbed a piece of driftwood that lay at hand and struck Adam repeatedly about the head. I don't know if that gave Adam the idea or not, but the monkey grabbed a shell out of the sand and struck back. We had often seen him using fortuitous tools like that.

The shell was that of some large clam or scallop. It might as well have had a knife's edge. Colin was already bleeding from the bites on his arms and from the re-opened gash on his face that he had had from the shipwreck, so it was not easy to see that more blood had been added to it. But Colin's legs began to kick, and then he was still.

Adam jumped up from the sand and honked to the sky. He hopped from one foot to another in a sort of dance while I stood frozen to the spot where Colin had pushed me.

The whole fight had taken less time that the telling. I still had not moved when the monkey turned to me.

"But he didn't kill you," said O Rourke.

"No. Of course not. I was the prize."

The professor had nothing to say to that and turned her head aside with a short "Oh." None of the rest of us could speak, either, although Danny Mulloney was crying quietly. As I said, I never thought so highly of Colin, but his had been a terrible way to die.

It was almost as if Mousie had read my thoughts. "You mustn't tell Colin's mother, any of you. She must believe he drowned with the rest."

"What," said Doc Mooney, and then he had to get his breath again. "What happened afterward?"

"Adam went back into the lagoon to look for more fish. He left me on the sand. It didn't mean anything to him. He had killed and he had . . . He had . . . But it was done as an animal does it: without thought, without . . . connecting. It was, in a way, almost clean.

"I sat hugging my knees to me, rocking back and forth on the sand for . . . I don't know for how long, until Adam came back out of the water, this time fishless. He seemed almost surprised to see Colin's body lying there. He hesitated, then took a step toward it.

"What he intended, only he can know, but I can imagine a few things that an omnivore can do with a carcass, and that I could not abide. I sprang up and ran to Colin and threw myself upon him.

"Everything up until then had been somehow far away. It had all happened so fast that I had not had time to *know* it. Even today, when I remember—and that is nearly every day—it is as if I am standing by a window looking out on a distant scene. Even myself, as if I were out of my very body. But at that one moment, it all crashed down on me and I cried and howled as I hugged Colin.

"Maybe it was the crying that stopped Adam. It may have been the first time he ever heard me *honking* and maybe that meant something. I don't know. It's not as though we ever shared any small talk. But he stopped and stood there and he watched me for the longest time and never made a sound. After a while, I became aware that he was no longer nearby. I turned and looked all around, but he was nowhere to be seen.

"I told Colin a lot of things, and you'll excuse me if I share none of them with you. After a while, there was nothing more to say, so I rose, donned my clothing once more, and dragged his corpse up the beach, away from the water, where I began to pile rocks atop it.

"Maybe you think it didn't matter, but it did. If I ever was to be rescued from that place, I wanted to be a person who ought to be rescued. I placed his shorts with him and also the stick that he had used so ineffectually in the fight. It seemed right, even if it now seems odd. I was not thinking very clearly.

"It took all the rest of the day to complete the cairn. Large, heavy stones are not easy to find, nor are they easy to move, and at the end of it all I was ravenously hungry.

"There was food back at our campsite, and fire, but I did not want to go there. I feared Adam would be there and I could not face him after what he had done to Colin and to me, regardless how innocent his animal heart. Yet hunger has its own arguments and in the end, I crept back, as quietly as I could.

"The stealth was wasted. Adam was not there. So I swooped in and seized the fruits and vegetables Colin and I had gathered and ate like a condemned man.

"When my belly was full, I decided to stay. Do you want to know why? *It was* my *village*. Colin and I had founded it, and *no damned monkey* was going to drive me out of it! I threw some more wood on the fire and it blazed up again and somehow that gave me heart. I could not imagine that Colin would ever wish me to give up. Do you think he didn't *know* when he turned to face Adam how it was likely to end? But it's never the end that matters. It's how you get there.

"I fashioned myself an assegai. I used a shell to chop a point into the end of a short stick. Then I fire hardened the point, and waited.

"He never came. Adam. I slept with the spear gripped in one hand and the shell in the other. Several times during the night I awoke at some sound or other, but I always awoke alone. In the morning, I took my weapons with me to the shore. I meant to visit the cairn—I did so every day until that Filipino freighter happened by—but I also meant to try my luck at spearing fish.

"When I reached the lagoon, I saw Adam. He was out near the reef, wrestling a large log across it. I did not know what he was up to, and stood on the shore watching with my spear in my hand, in case he should come for me again.

"Some instinct made him turn and for a moment or two he simply stood there with the surf crashing about him and stared back at me. Then he raised his nose and honked and, it was eerie and it may have been a coincidence, but it sounded very much like my own crying the day before. He paused and waited and I did nothing, so he imitated my cry again and this time, not knowing what else to do, I answered in the same fashion.

"Then he turned away and jumped into the ocean and, pushing the log before him, swam off in the direction of that black speck of land on the horizon.

"I watched for a long time, until his form had vanished into the dazzle of the water. I thought, *that is where the rest of them live*. On that distant speck. He had been out swimming and the storm had carried him here. Unless it was only that Adam thought it was his home and he was willing to take a chance on it. Those waters, the Filipinos told me later, are shark-infested, so perhaps he never made it. I hope he did not. I hope the sharks took him with the same thoughtlessness that he took my Colin. If they did, it might lessen my sin." There was an edge to her voice that we had never heard from Mousie Moore and I knew then that whatever else had transpired on that lost island, the woman who had been rescued was not the one I had lost.

"*Your* sin!" said Danny. "Why, you did nothing wrong."

"That's a hard thing to wish on anyone," said Doc, "even an animal."

Mousie shook her head, but did not look directly at Doc. "I think he was an animal when we found him. I don't think he was one when he left." She reached into her purse. "What is the score, Mr. O Daugherty?"

But Himself only shook his head. "It's on the house."

Mousie took a few bills from the purse and placed them on the countertop anyway. "It never is," she said. "Someone always pays."

There was silence in the Irish Pub for a long time after she had gone. It was, as I had known it would be, Professor O Rourke who broke it. "We must learn where that island is!" she said. "Still coming ashore! Oh, still coming ashore!"

Himself silenced her with a slap on the bar top. "No one here will ever speak of this again. Do you understand? She spoke in confidence, and you'll not be pestering her for latitudes and longitudes that she doesn't even know."

"But . . . Think of it! Another primate on the brink of intelligence!"

Himself would not be moved. "On the brink or over it, even if it all happened as Mousie said and it was not the product of her long isolation, what can the likes of us do by barging in on them, except get in their way? No, it's best that we let matters lie and maybe in time she can forget the wretched thing she did."

Doc growled a little in his throat. "Now, Tim," he said. "It wasn't exactly *she* that did it. If anyone sinned, it was Adam." He looked a bit uncomfortable when he said it. The imagery of sin did not appeal to him.

"No, Doc," Himself said. "You don't understand. Maybe you can't understand. Adam committed no sin when he killed Colin nor even in what he did afterward. He was only being a proboscis monkey, protecting his harem from an intruder male. But something in Mousie's cries, something in her mourning, got home to him and he 'perceived that he was naked and was ashamed.' So he avoided her all the next day, and fled the island rather than face her." He looked at us, one after the other. "She wasn't Eve. She was the snake. She brought knowledge of good and evil to a creature that had not known it before. Perhaps, if he made it home, to his whole race. That must weight gravely on her heart."

Doc scowled and twisted his highball glass between his hands. "I had another thought," he said, and he looked toward the end of the bar where Professor O Rourke sat. "If our ancestors really were living in the margin between land and sea when the sea began to dry out, why do you suppose they retreated toward the land?"

O Rourke blinked at him, but then recognized that he was deliberately changing the subject away from Mousie's horrid tale. "Why," she said, "because they did. Here we are, after all."

"Indeed. But there are tales of mermaids."

The professor had no chance to reply, for The O Neil arrived before she could say anything more. "Sorry to be late, Mickey," he apologized, "but it was such a nice day, I went down the pool for a swim." ■

Most people repent of their sins by thanking God they ain't so wicked as their neighbors.

—Josh Billings

The Dark Path, Walter H. Hunt, TOR, $27.95, 413 pp. (ISBN: 0-765-30606-9).

The Moon's Shadow, Catherine Asaro, TOR, $25.95, 479 pp. (ISBN: 0-765-30425-2).

Wondrous Beginnings, Steven H. Silver and Martin H. Greenberg, DAW, $6.99, 316 pp. (ISBN: 0-7564-0098-8).

Cretaceous Sea, Will Hubbell, Ace, $6.50, 341 pp. (ISBN: 0-441-00989-1).

Dragonhenge, Bob Eggleton and John Grant, Paper Tiger (distributed by Sterling), $29.95, 128 pp. (ISBN: 1-85585-972-6).

The Hundred-Acre Spaceship, Ralph Roberts, Farthest Star Science Fiction (distr. by Midpoint Trade Books, 27 West 20th Street, New York, NY 10011, 212-727-0190), $14.99, 352 pp. (ISBN: 1-57090-186-4).

With a Little Help from My Friends, Mike Resnick, Farthest Star Science Fiction (distr. by Midpoint Trade Books, 27 West 20th Street, New York, NY 10011, 212-727-0190), $16.99, 384 pp. (ISBN: 1-57090-193-7).

The Science Fiction Professional—Seven Years of "Ask Bwana" Columns, Mike Resnick, Farthest Star Science Fiction (distr. by Midpoint Trade Books, 27 West 20th Street, New York, NY 10011, 212-727-0190), $16.99, 352 pp. (ISBN: 1-57090-199-6).

Dreamer of Dune: The Biography of Frank Herbert, Brian Herbert, TOR, $27.95, 561 pp. (ISBN: 0-765-30646-8).

Adaptive Technologies for Learning & Work Environments, 2nd ed., Joseph J. Lazzaro, American Library Association (www.ala.org), $48, 232 pp. (ISBN: 0-8389-0804-7) (CD-ROM $35, ISBN: 0-8389-0814-4).

In May 2002, I said of Walter Hunt's first novel, *The Dark Wing*, that it was well worth attention. Humanity's space empire had met a thoroughly antipathetic enemy in the zor, and only when Admiral Marais hied off to trounce them thoroughly—"fair play" be damned!—and thereby earn admission into the zor scheme of things was there peace. Hunt's space navy I called a bit too Hornblowerish, but since that is almost traditional in the genre, what the hey. The novel succeeded, did well, and now proves to be the first installment in a quest that may well prove science fiction's version of *The Lord of the Rings*.

Really? If you recall, Admiral Marais had a mysterious aide, Captain Stone, who proved out to make everything go wrong. Found out, he vanished without a trace, and a bit later there was a rather cryptic conversation between off-stage aliens who clearly wanted both humans and zors destroyed.

Who were those aliens? Hunt didn't say, but the zor civilization was ruled by precognitive dreamers who saw everything in terms of a mythology phrased in terms of bright and dark, with Admiral Marais coming to personify the dark, the forces of destruction. Yet in the end Marais clearly represented only the dark side of god, esLi. The aliens must be es-Ga'uYal, the Destroyer.

The Dark Path opens eighty years after *Wing*. Sergei Torrijos, once aide to Admiral Marais, later absorbed into zor culture as the Gyaryu'har, bearer of the ancient sword of state, the gyaryu, used in the time before time to defeat esGa'uyal, has accompanied Admiral Tolliver and his squadron of six ships to Cicero to investigate the disappearance of two exploratory ships. The Cicero base is commanded by Jacqueline (Jackie) Laperriere, who with her aide, Ch'k'te, a zor Sensitive, experiences an inimical mind-touch. Torrijos adds as an omen that the zor High Lord has dreamed of threats. But Tolliver pooh-poohs all warnings and hies off to the system last visited by the missing ships.

One ship makes it home, and soon shape-shifting, mind-controlling aliens have seized control of Cicero. Jackie Laperriere manages to regain control long enough to evacuate the base, but the gyaryu is lost. So, it seems, is Jackie's career, for she soon faces an investigation into her failure of duty—a naval officer is *not* supposed to turn tail! Fortunately, the zor demand her services: She must pursue the gyaryu across the Plain of Despite, climb the Icewall, and defeat the foe. The images are from the zor mythology and the world of the High Lord's dreaming. All creation is threatened, and her role is that of the ancient hero Qu'u, who was long, long ago summoned by esLi to combat the esGa'uYal. She has a quest that has already begun to parallel the ancient Legend of Qu'u. She has the necessary spirit guide, Th'an'ya, ghost of her aide's late mate, the Icewall stands before her, and the aliens even call her Qu'u.

Come on! she cries. But events are oddly persuasive, and . . .

Meanwhile, though only one of Tolliver's ships returned, the rest were not all destroyed. Their crews were captured and enslaved. All but one, Owen Garrett, who can see through alien disguises. He is soon mounting a rebellion behind the foe's lines and discovering that there seems to be still another player in the game.

There *has* to be at least one more book in the series, for the quest is nowhere near its culmination. Jackie—or Qu'u—must reach Mount Doom and defy Sauron himself. Presumably Garrett's efforts will help, and then there is that other player . . .

If you enjoyed *Wing*, you'll love *Path*.

Catherine Asaro's "Saga of the Skolian Empire" began with *Primary Inversion* (reviewed here in July 1995). The long, long backstory began some six millennia in our past, when aliens transplanted humans to the distant world of Raylicon. In due time, the Skolian Empire arose, led by the Ruby Dynasty of Rhons, gifted "projective empaths" who are the only ones who can operate the star-spanning mental network or psiberweb that coordinates the Empire. Then they genetically engineered a variant of themselves that became the evil Traders whose empathy is twisted so that when they torture projective empaths, the empaths' pain fills them with transcendent joy.

Asaro's Saga began with an unlikely love affair between Sauscony (Soz) Valdoria and Jaibriol II, heir to the Trader Empire. Later volumes gave us the affairs of other members of the clan, always deeply embedded in galactic and imperial intrigues, until the Radiance War trashed the Traders, killed their emperor, all but exhausted the Skolians, and destroyed the psiberweb. The most recent installment, *Spherical Harmonic* (reviewed here in April 2002), saw some of the pieces beginning to come back together and posed the question of whether peace could be attained at last. After all, if Skolian and Trader could love each other . . .

Now we have **The Moon's Shadow**, which opens with the exchange of Eldrin, husband of Dyhianna Selei, Ruby Pharaoh and supreme leader of the Skolians, for a new Trader emperor, the seventeen-year-old Jaibriol III, late of Earth and the child of Soz and Jaibriol II. Eldrin has been tormented; it will be awhile before his mind is once more his own. Jai, thanks to his hybrid genetics, is as much a projective empath as any Skolian Rhon; surrounded by Traders, his mind is under constant threat, and he must struggle not to reveal himself as a "provider." Fortunately, a very few of the Traders have renounced their nature and made changes in their brains so that they cannot feed off others' pain. One such is Corbal Xir, who fancies himself as a power behind the throne. Another is the Empire's finance minister, Tarquine Iquar, who may be well over a century old but still looks good.

Jai is young, but he catches on fast to the business of being an emperor. He's also lucky. Tarquine paid an exorbitant sum for a Skolian slave (remember Kelric of *The Last Hawk*, reviewed here April 1998?) who turned out to be ill *and* promptly escaped. The subsequent lawsuit involves her, the insurance companies that reimbursed her loss, and the man from whom she bought the slave, and Jai gets trapped into coming up with a decision that must satisfy everyone without making too many enemies. He manages it in part by saying to Tarquine: "You will be my empress."

"Teenager Marries Centenarian" may sound like a headline worthy of the *Enquirer*, but it works out. Tarquine has all the political savvy and ruthlessness that Jai lacks, and when he pushes hard for peace talks between Skolians and Traders, she makes them work.

Will there be peace? The first steps are taken, but the destination lies still in the distance. We can be sure that Asaro has more to say.

And is this one any good? Well, when I gave a copy to my fiancée, I lost her for the weekend.

Interested in what Catherine Asaro's first published story looked like? It was "Dance in Blue," and you'll find it in **Wondrous Beginnings**, an anthology of firsts for the greats, both old and new. Besides Asaro, you'll find L. Sprague de Camp, Anne McCaffrey, Arthur C. Clarke, Hal Clement, Gene Wolfe, Barry Malzberg, George R. R. Martin, Orson Scott Card, Lois McMaster Bujold, Jack McDevitt, and half a dozen more.

Readers of this magazine may be interested in one brief statistic: Of the seventeen stories in this book, six came from *Astounding/Analog*. That may just be because the mag's been around for so long (over seventy years!), but it really has introduced a lot of new writers to the readers.

Will Hubbell is a writer and illustrator whose children's picture book, *Pumpkin Jack*, appeared in 2000. Now he tries his hand at SF with mixed success in **Cretaceous Sea**.

Begin with a poor little rich girl named Con (for Constance) whose Papa shows up one day with a mega-birthday present: She will accompany him and his fiancée Sara on an experimental jaunt into the days of the dinosaurs 65 million years ago.

Wow! What fun! If only Papa weren't such a prick, and Sara weren't such a mindless gold-digger, and time-travel impresario Peter Smith weren't such a slime-ball scumbag. On the other hand, there's Rick, a paleontology grad student hired as guide and gofer for the rest of the crew, once of the late African safari scene ("late" because the African wildlife is all gone). And they're off in a time machine that looks rather like a flying saucer with pasted-on labels all over the control board. When the destination, Montana Isle, proves to have an elaborate array of rooms carved out of the rock, the Astute Reader promptly begins to wonder where Peter Smith got his time-travel machine. Pretty soon Rick is wondering the same thing, and Con is discovering hidden tunnels and a room full of consoles.

Sixty-five million years ago? Just before the Chicxulub impact event that wiped out the dinosaurs? What's on that screen over there? A big rock in space? And don't those cryptic displays look suspiciously like count-down clocks? "Just before?" How "just?" Like maybe hours?

So Papa and Peter bug out, leaving the rest to fend for themselves. The rest of the novel—over half—becomes a post-catastrophe wilderness survival tale with, of course, a happy ending.

If you want an undemanding, pleasant read, this one won't make you feel you wasted the price of a paperback. Hubbell has a talent for invention and pace, so his tale has some charms, but it is, alas, far too predictable in everything but the exact nature of that happy ending.

Dragons have a remarkable hold on the human psyche. They appear in the myths and legends of many lands, and they have become a fixture of fantasy fiction. Were the myths inspired by the discovery of great fanged skulls in the rocks of mountains, remnants of an age long, long gone? That would make sense, but to say such a thing is mere speculation.

It is not surprising that the minds of some writers should look at dragons from a somewhat different angle, as beings with a biology and history of their own. Two decades ago, we saw Paul and Karin Johnsgard's *Dragons and Unicorns: A Natural History* (reviewed here in July 1993 as "a fascinating example of . . . the academic mind at play"). Now, Hugo Award and World Fantasy Award (etc.) winner John Grant has penned the creation myths of dragonkind in **Dragonhenge**, sumptuously illustrated by six-time Hugo (etc.) winner Bob Eggleton.

Millions of years before humans arrived on the scene, "In the beginning there was nothing in the Void except the First Dragon, who was called Qinmeartha and had no substance, but who possessed the Principles of Water, Fire, Earth and Air, and *was* those Principles. . . ." To fill the Void, Qinmeartha turned his essence into water, fire, earth, and air, and thus created the universe. Later Syor brought color, Joli discovered the knowledge of life, LoChi discovered song and laughter, and Angrboda found love. Then came the Ice Dragons and war and finally, in the last days, the construction of Dragonhenge, a mighty monument to all that was.

Grant successfully echoes the phrasings and rhythms of myth, while Eggleton fills the pages with awesome wings, fearsome claws, fangs, and scales, and graceful flights; with starscapes and landscapes; with vibrant color and vision. If you're a fantasy fan, or if you just like dragons, you'll love this one.

In his Foreword, Mike Resnick reveals that Ralph Roberts wrote **The Hundred-Acre Spaceship** some thirty years ago, but "the publisher went belly-up, and Ralph . . . became a publisher himself." In due time, Ralph remembered his novel and well, here it is, with Ralph as author, publisher, and even cover artist.

Just another self-published mantel ornament? Not at all. Granted the book could have used slightly more careful editing, but if you remember fondly the good old days of basement scientists and backyard spaceships, not to mention the ogling Papa Schimmelhorn and his delightful accent, you'll love it. Uncle Nired is a rich Russian immigrant, master of an industrial empire in the old American mold. His nephew Henry is a genius who flunked out of MIT from reading too much SF. But he's a genius, you understand, and, "Look, Uncle. This is my latest invention. It's a disruptor beam, and look at the holes it punches in yon tree. And into the dirt, and out of the Pacific Ocean on the other side of the planet, and . . ." The Australian jet? "Sorry about that."

Pretty soon Henry has a gadget that can float Uncle Nired's hundred-acre estate into the air (remember the spindizzy?), and that's when the CIA and the Marines show up to take it all away—the CIA director wants to use the new tech to rule the world, and the chicken-plucker president is powerless to intervene. Fortunately, Uncle Nired has a faithful retainer in the person of 85-year-old Fergus MacTavish, veteran of the Black Watch regiment, who is perfectly willing—between sips of scotch—to show the Marines how it's really done. And when the crunch comes . . . "'They are in the big trouble,' Uncle Nired said delighted, returning her hug. 'They will haf us surrounded, the poor bastards. They will haf not any way to escape.'"

Up, up, and away! But the resurgent USSR has a squadron of Soyuzes ready to attack while on their way to seize Mars for the Hammer and Sickle, NASA has some shuttles to join the race, and so do China, Japan, Israel, and a few more. As soon as Uncle Nired fights off the barbarian hordes, they'll join the race too.

The upshot? You know who wins, who saves the day, who gets the girl (remember Papa Schimmelhorn?). What you don't know is that despite all the death rays and tractor beams whizzing around, no one gets hurt!

Good old-fashioned fun.

Ralph Roberts' Farthest Star outfit has been mentioned here before for its reissues of Mike Resnick's books (e.g., the *Velvet Comet* series). In the same package as *Hundred-Acre Spaceship*, there arrived **With a Little Help from My Friends** and **The Science Fiction Professional—Seven Years of "Ask Bwana" Columns**. The former is a collection of 25 short stories Mike has written with such collaborators as Catherine Asaro, Barry Malzberg, Kristine Kathryn Rusch, Michael Burstein, and many more, with an introduction by his daughter Laura (who refuses—repeat: REFUSES—to collaborate on a story with him). The latter is drawn from his long-running Q&A column in *Speculations* (www.speculations.com), where as the consummate professional he offers a wealth of useful advice. People keep asking him about how he writes and where he gets his ideas, but the real meat is what he has to say on what comes after the writing—from contracts to promotion.

Was Frank Herbert's *Dune* the finest SF novel of all time? Some people think so, while others might argue for something by Gene Wolfe or Neal Stephenson or Iain Banks or any of many other writers. Be that as it may, *Dune* came along just as ecological consciousness was reaching the general public, it struck a chord, and it and its several sequels sold zillions of copies, making Herbert a great deal of money.

Yet that success did not come easily. Herbert endured years of relative poverty in journalism and speech-writing—exacerbated by miserable money-management skills—while he struggled to find his voice. Fortunately, his wife Beverly was endlessly supportive, even giving up her own prospect of a career as a creative writer to keep food on the table. The children just endured, for Herbert was the sort of dad who would strap his kids into a lie detector.

Brian Herbert tells it all in **Dreamer of Dune: The Biography of Frank Herbert**. But he is not out to condemn his Dad: In time he came to understand and accept, and as adults the two had a good relationship. His brother Bruce fared less happily. His mother came into her own as Frank Herbert's business manager, and her lung cancer and heart troubles brought out a side of Frank—loving, tender, supportive, utterly dependent—that had not earlier shown.

Brian Herbert's approach in showing this is fairly standard—Frank's childhood and parents, early years, first wife, second wife, struggle on struggle, eventual success, illness and loss, third wife, more illness. Yet he is not only showing his father's life; he, as the son, is an essential part of that life, and when he turns to his own thoughts and reactions, his developing rapprochement, relationship, and eventual collaboration, he is providing his own autobiography as well. Since Brian is a writer of some renown himself, this adds interest for fans of either man. It also casts additional light on Frank.

A very nice job.

At the 2002 Arisia I shared a panel with Joe Lazzaro, director of the Adaptive Technology Program at the Massachusetts Commission for the Blind in Boston. Later he offered me a copy of his latest book, the second edition of **Adaptive Technologies for Learning & Work Environments**.

He himself is way ahead of his own book, for he is, he tells me, in line to receive the Dobelle Institute's artificial vision system (http://www.artificialvision.com/vision/index.html). The book focuses on the many ways modern computer technology can help with visual, aural, speech, motor, and learning disabilities, beginning with the accessibility options available with Windows and other operating systems. (Do you know about Windows' StickyKeys for folks who have trouble with hitting two or more keys at once? FilterKeys? MouseKeys? Look under Settings-Control Panel-Accessibility Options.) It also discusses a multitude of hardware and software products, including screen readers, screen magnifiers, Braille printers and displays, scanners, voice command and dictation systems, alternative input systems, TTYs, on-screen keyboards, alternative communication systems, word predictors, and more. Appendices list sources, helpful agencies and organizations, and funders, and summarize disability law. This book is a great resource not only for the disabled, but also for those who live with or assist the disabled, as well as for human resources departments, schools, and social service agencies.

There are even tidbits for the rest of us—shortcuts, of course, but also a brief description of Baudot coding, a five-bit binary system once used for enhancing telegraph transmission and still used as one option for text telephones. The term looked suspiciously similar to baud, so I Googled a bit and quickly discovered that the baud was named after Baudot's creator, Emile Baudot, as a unit of transmission speed (one Morse code dot per second, originally).

Why didn't Joe tell us that? He had a different mission in mind—Just the facts, please, with very few digressions and blessed by a lean, direct style that makes a large amount of information very accessible. ■

> When a true genius appears in the world you may know him by this sign: that all the dunces are in confederacy against him.
>
> —Jonathan Swift

Dear *Analog*,

I just finished reading "Distance" by Maya Kaathryn Bohnhoff (Okay, so I'm a little behind). What a great story! I'm a bit of a baseball fan myself, and that just tickled my fancy. The story also gives a fine example of why we need more well-rounded people in this world—for the ideas that one mind with many interests can generate. Let's hope that a real first contact (if and when it comes) is equally benign.

Don Harrington
Maple Valley, WA

Dear Mr. Schmidt:

If aliens arrive wanting to play baseball, my vote would be to send them back.

John Ostapkovich

Hi Stanley,

I just read the editorial in the February issue of *Analog*. You say, "the most literal reading of Genesis . . . doesn't jibe with . . . the evidence we've accumulated."

I, for one, think everyone has interpreted this passage incorrectly, focusing too much on the "six day" time period mentioned. That is not necessarily meant to literally be six days. Even other Biblical writers go as far as to say, ". . . a thousand years is like a day to the Lord." So, maybe a million—or billion—years is, too.

More interesting is the sequence of events, as creation unfolds:

* The (Earth) was without form, and darkness was [everywhere]. (Pre Big-Bang?)

* And God said, let there be light! (The Big-Bang)

* And God made the firmament . . . (The creation of the planets and solar system.)

* And God . . . gathered the waters together, and let the dry land appear. (Cooled, "habitable" Earth.)

* And God said, "let the Earth bring forth grass" and etc. (Plant life first, to oxygenate the atmosphere.)

* Then God said, "let the waters bring forth abundantly . . ." (The seas as the source of vertebrates, and others.)

* Next, God brought forth the fowl and winged creatures.

* After that, came the cattle, creeping things, and the other beasts of the earth. (Other land-dwelling creatures and mammals.)

And, finally:

* God said, "Let us make Man in our image . . . and let them have dominion over [everything]." (Man, the "pinnacle" of evolution, comes last.)

To me, this sounds a lot like the sequence of events we've been taught in science classes . . .

Second, speaking of killing in the name of religion, I heard a great song recently, called "Not In MY Name!" I don't know the singer, or all the verses, but the one that struck me went something like this:

"For centuries I've watched you kill
people not of your own beliefs.

I thought I made it clear in the Bible,
Torah, and Koran
What part of 'love your enemies'
don't you understand?
You're not acting in My Name!"

I think that really cuts to the heart of things; those who kill for their faith, don't understand their faith.

Well, that's about all I have to say for now... You don't have to print this, but maybe it'll provide some ideas for future editorials.

Thanks for a great magazine! Like so many others, I've been a subscriber for maybe twenty plus years, and have every copy I've received.

John

Dear Dr. Schmidt,

Although I agree with some of your arguments that faith-based thinking (Editorial, February, 2003) has historically had value to the societies that host it, I find one of your arguments for that thesis logically flawed. You state that if faith were not useful to societies, non-faith-based societies would out compete and replace faith-based societies. Your argument implicitly assumes that an idea or meme (the idea-based analog of a DNA-based gene) exactly shares the interests of its host's society, which is like saying that malaria must benefit societies where it occurs, else malaria-free societies would out compete those societies.

It is certainly true that one evolutionary strategy for a symbiont to achieve widespread distribution is to benefit its host, but, as malaria and hundreds of other harmful parasites amply demonstrate, this is hardly the only strategy. Figuratively speaking, ideas, or memes, have their own agendas, just as do living parasites; to remain active in the current host believer and to propagate to more host believers. Having a built-in component that says "Do not question me!" has obvious survival value to a wide class of memes, completely independent of any value this component might or might not have to the host or to the host's society!

Dan Tow
Palo Alto, CA

Dear Dr. Schmidt:

I appreciated your February editorial concerning the value of faith, and agreed with much of it. However, I'm not convinced that faith-based belief systems perform a useful function, despite their ubiquity.

Ask not what religion can do for people, but what people can do for religion. Could it be that religions exist for their own reasons, in the same way as viruses? If one considers them as contagious mental diseases, it becomes possible to ask questions about the epidemiology of faith. How does valuing belief without evidence affect transmission? How do tolerant religions affect the transmission of intolerant religions? Of what value to the religion is attractive content such as the assurance that adherents will go to a better place when they die, and that their enemies will be punished? How does a religion's moral code affect its survival? How are skeptical belief systems different from religious ones?

One recent study of why people believe (published in *Skeptical Enquirer*, though I forget which issue) showed that they usually believe for what appear to them to be good and consistent reasons. I remember once being asked "How can an intelligent man like you believe in evolution?" My inquisitor, an intelligent and literate person himself, did not consider the existing evidence as solid or logically consistent. He had what he understood to be compelling reasons for discounting it.

Why would religions encourage blind faith? For the same reason that computer viruses disable virus protection software if they can, or target unprotected systems if they can't. Encouraging blind faith promotes the uptake of the entire belief system. Furthermore, once a virus is in place, it can run its own virus protection software to ensure that other viruses can't compete.

This is not to say that skeptical belief systems don't do the same thing. However, the critical difference is that skeptical belief systems do not code for their own reproduction, and hence do not try to maximize their survival as a function of transmission rates.

The religions of the world occupy a unique environmental niche. They exist because they can, and they mutate to assure their own survival. They may have little or nothing to do with our own.

Steve Hansen Smythe
Calgary, Alberta, Canada

Dear Stan,

In your editorial in the February 2003 issue, you asked the question "Why has 'faith' *per se* come to be regarded as an admirable thing in so many cultures? What is the survival value of a belief in something that cannot be proved?" I would suggest that the answer to these questions is that the value of faith and belief to a society is that it promotes a long range viewpoint for human behavior. A characteristic of any successful human society is that its members are willing to concentrate on distant goals while foregoing short term pleasures and enduring discomfort. For example, the literature of science contains many examples of dedicated scientists who labored for many years and overcame enormous difficulties and rejection by their peers until at last their efforts were rewarded by increasing human knowledge about the Universe. Scientists have "faith" in science that leads to this type of long range behavior, which is a necessity for increasing scientific knowledge. Similarly, much of "morality" is often presented in the form "If everyone behaved in that way, life would be nasty." This requires a long range view, because the actions of a single individual are possibly advantageous to that individual and occur immediately, while the societal damage occurs many years later. Any belief system that forces individuals to think in terms of their entire lifetime instead of the moment, especially ones that promise rewards/punishment after death, will necessarily force its adherents to focus on long range consequences of their behavior. A culture that values these beliefs will be much better adapted, by promoting successful long range human behavior, than will a culture which does not value "faith." Thus, members of such a culture will admire people with strong beliefs since these individuals will tend to contribute more to society by their long range view which allows them to focus on goals despite current obstacles and/or denial of transient pleasures. Unfortunately, "true believers," even scientists, are often very intolerant of those who do not agree with them. Such intolerance can lead to destructive actions—unhealthy versus healthy obsessions. Thus cultures have the difficult problem of encouraging very dedicated long range "faith" behavior while preventing excesses. In such a balancing act, it is not surprising that problems frequently arise.

Thank you for listening to my comments.

Albert Menard
Saginaw MI

Dear Dr. Schmidt:

In your February 2003 editorial, "Useful Illusions & Deadly Faith," you made some excellent points, as usual, but I question your apparent belief that the Muslim fanatics who have declared war on Western civilization, and have already accomplished the most destructive attack ever made on the United States, have been "emphatically disavowed by most other Muslims." I would love to believe this is true, but the evidence suggests otherwise. Among Muslims, strong denunciations of terrorism seem to be the exception, not the rule.

The public media in Muslim nations

are filled with vicious anti-U.S. and anti-Israel propaganda, not anti-terrorism propaganda. Opinion polls in the Arab world indicate general approval, or at least very little strong disapproval, of what happened on 9/11/01. (Along with the inevitable "Jewish conspiracy" theories, of course.) Even more important, where are the uprisings by Muslims, particularly clergy, against Osama bin Laden and his followers who have blasphemed Islam with terrorism and mass murder? Some have said that Islam has been "hijacked" by a small number of fanatics. If so, the passengers on the hijacked vehicle, with rare exceptions, do not seem to be complaining very much.

Marc Russell
Los Angeles CA

Dear Editor,

In the February, 2003 *Analog*, Stanley Schmidt argues that religions must serve some useful function since they appear in so many human societies and, otherwise, the societies without religious beliefs would have out competed the societies with religious beliefs. He suggests that the useful function of religions is "to provide a common body of tradition and a basis and authority for a moral code."

It is hard to see how this can be true since, for most of human history, religions did not, for the most part, promise rewards and punishments in an afterlife for a good or bad life. Except for the paradise promised the adherents of the Eleusinian Mysteries and the punishments threatened for those who committed what were considered particularly heinous crimes, such as parricide and incest, a shadowy existence after death was all the average Greek could expect. A character in the *Odyssey* says that it is better to be a beggar on Earth than king of all the underworld. The Aztecs had a special paradise for those who died by drowning, but there were no generalized rewards and punishments for living a good or bad life.

But on the other hand, when you tally up all the countless lives lost in crusades and jihads, the number of women burned alive at the stake for being witches, the numerous gays likewise burned for being "sodomites," those who lost their lives in anti-Jewish pogroms, and all those who perished in the flames for belonging to the "wrong" religion, it is hard to see how religion has not had a new negative influence in human history.

A paraphrase of Nobel Laureate Steven Weinberg says it best. "With or without religion, you will have good people doing good things, and evil people doing evil things, but for good people to do evil things, that takes religion."

Robert Halfhill
Minneapolis, MN

Dear Dr. Schmidt,

Your February 2003 editorial, "Useful Illusions & Deadly Faith," was a thought-provoking follow-up to your first statement of the hypothesis that "a strongly held belief is a good thing only insofar as the belief is correct and not harmful to its holder or others." I was glad I did not respond to the first editorial because you answered several of my questions in your second article. However, I must challenge part of your hypothesis and part of your conclusion.

In the first place, I would contend that if a belief is correct, then the strongly held belief is a good thing regardless of the effect on the holder or others. To use your examples, a society which believes that fire burns and gravity pulls things down is at a comparative advantage no matter who is harmed by the diversion of resources to deal with these facts. (If you have trouble thinking of people who could be harmed, ask your contractor how much compliance with building codes added to the cost of your home.) I am not saying that holding a true belief entitles you to harm others, but if a belief is correct, then the harm may simply be unavoidable. To use an example sure to rile, if the beliefs of Islam concerning Allah and what is expected of humankind are correct, if you and I are going to be judged by those standards one day, then a level of belief that generates adherence to those standards is a good thing, at least for the believer. Anybody else will eventually be beyond help anyway, and whatever benefit they accrued in this world due to unbelief will prove to have been valueless. Plug any religion you like into those last two sentences. The fact that one can not scientifically prove that any one religion is true is irrelevant. If one of them is true and you believe, you are better off than if you do not, in this world and the next.

My second contention is with your statement that "a strong moral code can exist independently of belief in a supreme being." You stated that "it's clear that it can and often does." But you had previously pointed out that "[j]ust about any human culture you can think of is based largely on at least one" belief system with faith as a central characteristic. Please name a nation or culture in history or in the world today that exists independent of some faith-based moral standard. For starters, forget communism. Christianity and Confucianism—not to mention more ancient faiths—were irreplaceably involved in the foundations of the late Soviet Union and the PRC, and communism is not doing too well competitively these days anyway. Socialism? Sorry, but it is impossible to separate Europe from its religious roots, as nice as it would be, for several reasons. Sure, there are modern philosophers, and some not so modern, who have espoused in great detail "rational" moral codes, but who of them have ever seen their grand scheme put into widespread, enduring practice?

For what it is worth, I reside in the conservative, some might say fundamentalist, wing of the Christian faith and I often cringe at the statements of *The Philadelphia Trumpet*. Monotheism, as far as I am aware, always seems to conclude history with a world unified under one religion, but I can offer you the comfort that if and when such a world comes to pass, we will no longer be dealing with "faith." Check the writings of Judaism, Islam or Christianity; the one-world scenario includes a live performance by God (Allah? Yahweh?) and the "rational" folks will have all the verifiable proof they can handle.

Until then, keep up the good work and keep an open mind. "There are more things in heaven and in earth than are dreamt of in your philosophy." Considering the scope of things dreamed of by *Analog*'s writers and readers, is a Supreme Being really out of the question?

Scott Pickles
Newtown, CT

You're right that at least most existing nations and other formally recognized "cultures" have at least a high incidence of tying their moral codes to belief in a supreme being—but that has nothing to do with my argument, which was not about how popular *morality not so tied is in existing cultures, but about the fact that people can and do formulate and live by such codes. Within this country, for example, you can easily find a great many people who have and live by strong moral precepts—and to a large extent even agree with each other about what they are—without such underpinnings. The starting point is thoughtful consideration of such questions as "What if everybody else did this?" and "When can I logically justify interfering with someone else's actions—or vice versa?"*

Incidentally, many people commenting on this editorial assumed I was using "faith" and "religion" synonymously. I was not. ■

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UPCOMING EVENTS Anthony Lewis

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11–13 July 2003
READERCON 15 (literary-oriented SF conference) at Burlington Marriott, Burlington, MA. Guests of Honor: Hal Clement, Rudy Rucker, Howard Waldrop. Info: Readercon, Box 38-1246, Cambridge MA 02238-1246; info@readercon.org; www.readercon.org

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11–13 July 2003
SHOWMECON (Missouri SF conference) at Four Points Sheraton, Earth City, MO. Guest of Honor: Timothy Zahn. Artist Guest of Honor: Alan M. Clark. Fan Guest: "Uncle Timmy" Bolgeo. Special Guest: Dick Durock. Registration: $35 (includes con T-shirt—specify size), $40 at door. Info: ShowMeCon, Box 410115, Creve Coeur MO 63141-9998; info@showmecon.com; www.showmecon.com

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11–13 July 2003
TORONTO TREK 17 (Trek and media conference) at Regal Constellation Hotel, Toronto, Ontario, Canada. Guests: James Marsters, Julie Caitlin Brown, Erin Gray, Gil Gerard. Registration: USD35/CAD48 until 31 May 2003, USD58/CAD58 at the door. Info: Toronto Trek, Box 7097, Station A, Toronto, Ontario, Canada M5W 1X7; +1.416.410.8266; tcon@icomm.ca; www.tcon.ca [Note to US readers: first class postage to Canada is $0.60 for the first ounce]

18–20 July 2003
CONCERTINO 2003 (SF filk conference) at Crowne Plaza Hotel, Worcester, MA. Guests of Honor: Jeff & Maya Bohnhoff. TM: Erica Neely. Choirmaster: Ed Stauff. Listener Guest: Priscilla Olson. Writer Guest: Ellen Kushner. Interfilk Guest: Rika Koerte. Registration: $42 until 15 June 2003. Info: M.A.S.S. F.I.L.C., Inc.,18 Cottage Ave., Arlington MA 02474; +1.781.646.3118; info@massfilc.org

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18–20 July 2003
CONESTOGA 7 (Oklahoma SF conference) at Tulsa, OK. Guest of Honor: David Brin. TM: Esther Friesner. Fan Guest of Honor: David Lee Anderson. Info: www.tulsafandom.com

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25–27 July 2003
CONFLUENCE 2003 (Pittsburgh area SF conference) at Four Points Sheraton, Pittsburgh PA. Guest of Honor: Allen Steele. Featured Filk Guest: Nancy Louise Freeman. Registration: $35. Info: Confluence 2003, Box 3681, Pittsburgh PA 15230-3681; +1.412.344.0456; confluence@spellcaster.org; http://trfn.clpgh.org/parsec/conflu/index.html ■

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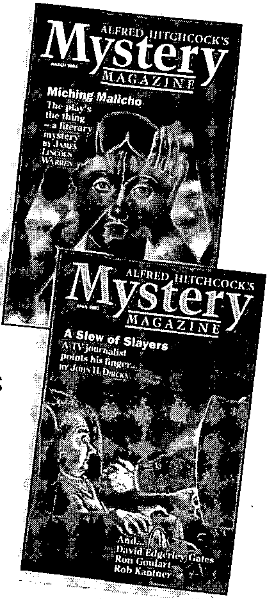
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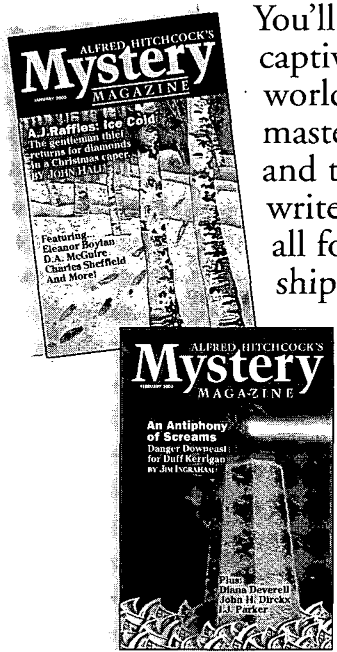
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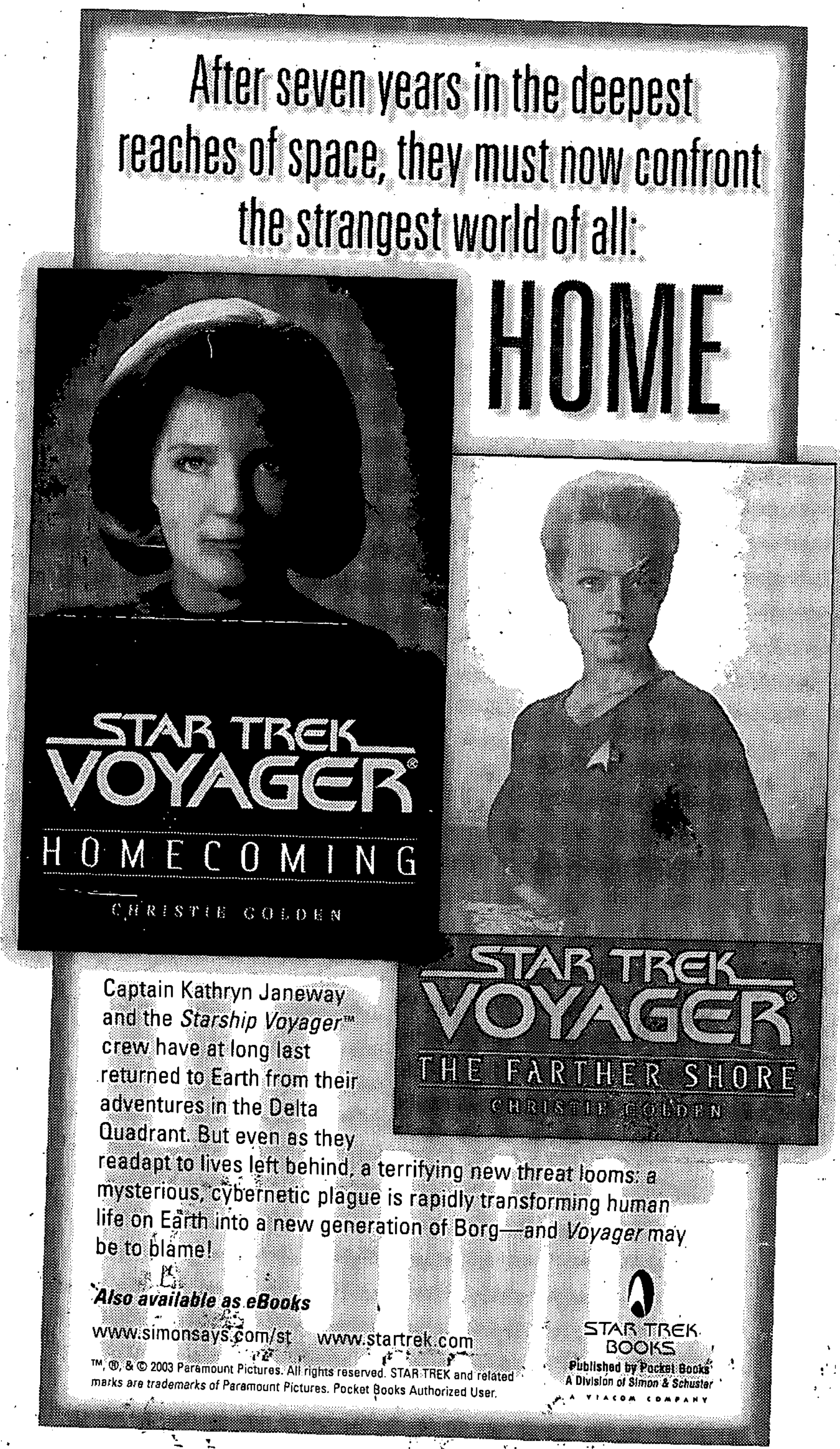

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